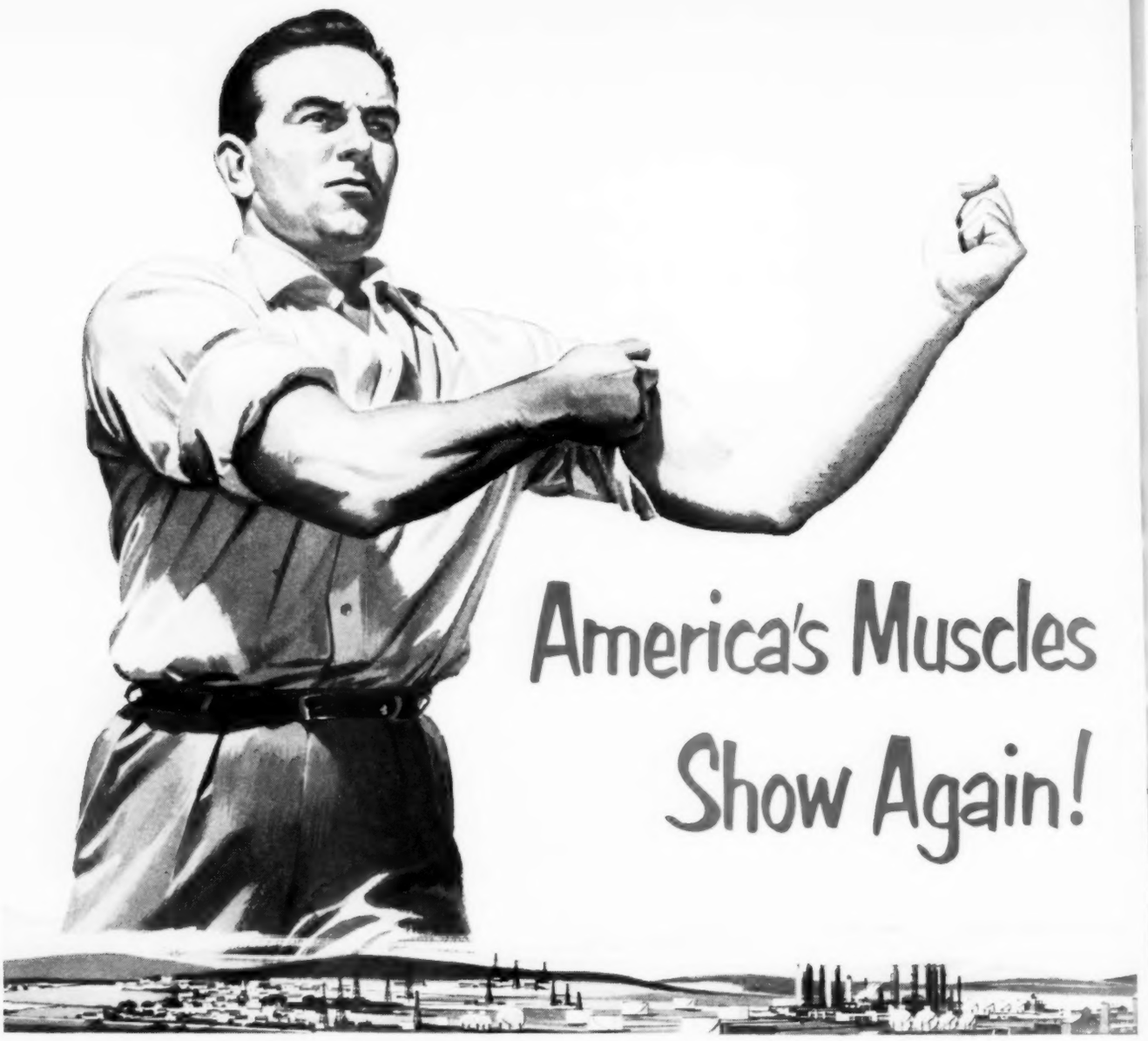
Chem

ARMED FORCES CHEMICAL JOURNAL

JULY
1951



America's Muscles Show Again!

Industry's needs grow bigger by the hour. From every quarter comes the cry: "More steel . . . more oil . . . rubber . . . paper . . . textiles!" The same is true of Agriculture, for a hungry world awaits.

The task is tough. To meet it, America's chemical manufacturers are bearing down with brains and sweat . . . again working to perform the miracles of production which make our Nation's might.

For its part, General Chemical is turning out greater tonnages of vital basic chemicals upon which industry and agriculture depend so heavily.

Our every resource is committed to the job. You'll see it reflected in the output of our 34 producing works, which are meeting problems of raw material shortages and unprecedented demand. You will find it in the intelligent help of our sales and technical service men, wherever you need them.

General Chemical Products for Industry
ACIDS • ALUMS • SODIUM COMPOUNDS • PHOSPHATES • FLUORINE DERIVATIVES • OTHER HEAVY CHEMICALS • REAGENTS FINE & SPECIAL CHEMICALS

General Chemical Products for Agriculture
DDT • BHC • PARATHION LINDANE • ARSENICALS FUNGICIDES • OTHER ORGANICS & INORGANICS

BASIC CHEMICALS
FOR AMERICAN INDUSTRY

GENERAL CHEMICAL DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 RECTOR STREET, NEW YORK 6, N. Y.

ARMED FORCES CHEMICAL JOURNAL

OFFICIAL PUBLICATION OF THE ARMED FORCES CHEMICAL ASSOCIATION
ROOM 523, 1129 VERMONT AVE., N.W., WASHINGTON 5, D.C.

VOLUME V | JULY, 1951 | NO. 1

COVER PHOTO

Major General E. F. Bullene (center) is sworn in as Chief Chemical Officer, Department of Army, by Major General W. E. Bergin, acting The Adjutant General, on June 21. The ceremonies took place in the Pentagon office of General J. Lawton Collins, Army Chief of Staff, and was witnessed by Mrs. Bullene, civilian and military members of the Army staff, and Chemical Corps staff officers.

INDEX

ADVERTISERS

Published quarterly—January, April, July, October—by the Armed Forces Chemical Association, located at National Headquarters, Armed Forces Chemical Association, Room 523, 1129 Vermont Ave., N. W., Washington 5, D. C. Entered as second class matter at the Post Office at Washington, D. C., under the Act of March 3, 1879. Additional entry at Nashville, Tenn. Subscription price $2.00 per year to members; $4.00 per year to non-members.

EDITORIAL

June 6, 1951

MEMBERS OF THE ARMED FORCES CHEMICAL ASSOCIATION:

It is a great honor to greet you once more as President of the Armed Forces Chemical Association. I am happy to report that our past year has been one of accomplishment. We have made gains all along the line in membership, in cash reserves, in aid to our members and to the Armed Forces alike, and in appreciation of our Association by others. Our gain in membership illustrates the faith of the men in Industry. Our officers regard this as a challenge to do more in the way of decreasing misunderstandings and increasing mutual respect between the Armed Services and Industry.

General Marshall told the West Point graduating class that "Army Officers in a Democracy can expect to be misunderstood time and again." I agree with this. But the Services are not a race apart in being misunderstood. In these times Industry is misunderstood even more than the Services and their Officers. The promotion of a better understanding is one of the most important and yet one of the most neglected factors in our country today. Along with the other responsibilities of the Executive Committee we pledge ourselves to work for the betterment of human understanding and human relationships. If progress is to be made we shall need from each of you a helping hand.

W. E. LAWSON, President
Armed Forces Chemical Association

DIRECTORS-AT-LARGE
ARMED FORCES CHEMICAL ASSOCIATION

1951-1952

COL. E. R. BAKER
Continental Oil Company

DR. RALPH CONNER
Rohn & Haas Co.

LELAND I. DOAN
Dow Chemical Co.

DR. P. K. FROLICH
Merck and Company

COL. L. WILSON GREENE
Army Chemical Center

WILLIAM J. HARSHAW
Harshaw Chemical Company

R. W. HOOKER
Hooker Electrochemical Company

DR. H. F. JOHNSTONE
University of Illinois

DR. DONALD B. KEYES
National Association of Manufacturers

COL. LUDLOW KING
Owens Corning Fiberglas Co.

SIDNEY D. KIRKPATRICK
Chemical Engineering

DR. WILLIAM N. LACEY
California Institute of Technology

H. J. MADDEN
Ethyl Corporation

H. B. McCLURE
Union Carbide & Carbon

E. V. MURPHREE
Standard Oil Development Co.

DR. WALTER J. MURPHY
Industrial Engineering Chemistry

DR. ALBERT W. NOYES
University of Rochester

DR. M. E. SPAGHT
President
Shell Development Co.

DR. E. H. VOLWILER
Abbott Laboratories

DR. HAROLD C. WEBER
Masssachusetts Institute of Technology

6th Annual Meeting

AFCA HOLDS 6th ANNUAL MEETING AT ATLANTIC CITY

The Sixth Annual Meeting of the Armed Forces Chemical Association held May 10th and 11th at Atlantic City, N.J., was in every way successful. The attendance was excellent, and it was the concensus of those present that they had found the meeting enjoyable and profitable. There was high praise for the smooth execution of the arrangements for the various events and Chairman Bob Norman was highly commended for their excellence.

The social side of the meeting opened with the cocktail party on May 10th. This party started promptly on schedule, but those in attendance showed their approval by ignoring the terminal point of the schedule.

Directors Meeting

President Lawson opened the Directors meeting by briefly reviewing the accomplishments of the Association during the preceding year. It has been a year of substantial growth, he pointed out, in activity, in membership and in strength of purpose. There has been a material increase in the amount and in the quality of the activities of the various Chapters, he said, and cited the splendid showing of the Chicago and New York chapters in presenting significant programs whose attendances were unprecedentedly high. Boston and Edgewood chapters have stepped up their activities and the Cleveland, Dallas, San Francisco and Los Angeles chapters all evidenced growth in interest and membership turn-out at their meetings. Wilmington continued, he said, to hold lively and interesting meetings. For the coming year Dr. Lawson called for a further enlargement of Chapter activities not only by Chapters presently engaged in ambitious programs, but by Chapters which are currently less active.

Financial Statement

The Secretary-Treasurer submitted a comprehensive financial statement which was distributed to the Directors present, and subsequently sent to all Directors. This statement showed outstanding improvement in the financial position of the Association. From a not too satisfactory net worth of the year before an increase had been achieved to a figure considered eminently sound and satisfactory. "Thus," Secretary-Treasurer Jacobs' report said, "the capacity of this Association to fulfill its obligations is greatly strengthened."

Fred M. Jacobs

The financial report was enthusiastically approved, and on the motion of Col. Bob Norman the Directors passed with acclaim a resolution commending Secretary-Treasurer Fred Jacobs for an outstanding job done. Because of illness Mr. Jacobs was unable to attend the meeting.

Membership

The net membership of the Association showed a material increase during the year. This increase resulted from the notable gain in group and sustaining memberships, which presently consist of 131 group and 9 sustaining members. This splendid gain in corporate membership was due to considerable effort on the part of both National and Chapter officers. Colonel Frederick was credited with obtaining a substantial block of group members and in acknowledging this commendation, Col. Frederick invited attention to the fact that President Lawson had himself obtained the largest number of new group members.

In considering this gross gain in membership, it was noted that the individual membership (i.e., those members who are not comprised in the group memberships) had fallen off somewhat from the year before. This fall-off was the subject of considerable discussion. It was agreed that the most promising program for reversing this trend would be a vigorous campaign to increase our membership among Reserve and active duty officers. It was brought out that the JOURNAL, under the editorship of Lt. Col. Rodier, has established as a major policy the emphasis upon material which will be of interest and of professional value to the chemical officer. It was pointed out that a keen and ambitious officer of the Corps could hardly afford to overlook the only journal exclusively devoted to his professional field. Salesmanship is required, however, to bring this to the attention of those eligible to membership.

Directors-at-Large

President Lawson announced the results of the election, by the membership, of Directors-at-Large for the ensuing year. He expressed keen satisfaction at the outstanding calibre of the men elected, the list of which follows:

Col. E. R. Baker, Continental Oil Co., Ponca City, Okla.
Dr. Ralph Connor, Rohm & Haas Co., Philadelphia, Pa.
Leland I. Doan, Dow Chemical Co., Midland, Mich.
Dr. Per K. Frolich, Westfield, N.J.
Col. L. Wilson Greene, Technical Command, Army Chemical Center, Md.
Dr. William J. Harshaw, Harshaw Chemical Co., Cleveland, Ohio
R. W. Hooker, Hooker Electrochemical Co., Niagara Falls, N.Y.
Dr. H. F. Johnstone, University of Illinois, Urbana, Ill.
Dr. Donald B. Keyes, N.A.M., New York, N.Y.
Col. Ludlow King, Fiberglas Corp., Washington, D. C.
Sidney D. Kirkpatrick, New York, N.Y.
Dr. William N. Lacey, Calif. Institute of Technology, Pasadena, Calif.
Harold J. Madden, Ethyl Corporation, Baton Rouge, La.
H. B. McClure, Union Carbide & Carbon Corp., New York, N.Y.
E. V. Murphree, Standard Oil Development Co., New York, N.Y.
Dr. Walter J. Murphy, American Chemical Society, Washington, D.C.

Dr. Albert W. Noyes, University of Rochester, Rochester, N.Y.
M. E. Spaght, Shell Development Co., Emeryville, Calif.
Dr. E. H. Volwiler, Abbott Laboratories, North Chicago, Ill.
Dr. Harold C. Weber, M.I.T., Milton, Mass.

Election of Officers

The Nominating Committee then presented its nominees for the various officers of the Association. Mr. Hilton Smith presented this report on behalf of Chairman Earl Stevenson, who found it impossible to attend this session of the meeting. The Committee's slate was presented, following which President Lawson asked for such additional nominations from the floor as any Director might wish to present. None were offered. Doctor Lawson then suggested that the Directors vote upon each nominee separately; but on motion it was unanimously voted that the nominations be closed and that the slate presented be declared elected.

There follows the results of the election:

President, Dr. Walter E. Lawson, E. I. du Pont de Nemours & Co., Wilmington, Del. (Re-elected.)

1st Vice President, Mr. L. W. Munchmeyer, Assistant General Manager, Ansco, General Aniline and Film Corp., Binghamton, N.Y. (Re-elected.)

2nd Vice President (Chairman, Finance Committee), Colonel Robert T. Norman, Stein Bros. & Boyce, Washington, D.C. (5th Vice President last year.)

3rd Vice President (Chairman, Organization and Membership Committee), Lt. Colonel E. E. Frederick, Chicago, Ill.

4th Vice President (Chairman, Publications Committee), Dr. Benjamin R. Baldwin, Alexandria, Virginia. (Re-elected.)

5th Vice President (Chairman, Meetings and Conventions Committee), Mr. H. S. McQuaid, E. I. du Pont de Nemours & Co., Wilmington, Del. (3rd Vice President last year.)

6th Vice President (Chairman, Research and Development Committee), Rear Admiral N. S. Prime, Frederick, Md.

7th Vice President (Chairman, War Mobilization Planning Committee), Colonel E. R. Baker, Continental Oil Co., Ponca City, Okla.

With the re-election of Dr. Lawson, Col. Harry A. Kuhn remains Immediate Past President.

The meeting of the Board of Directors then adjourned.

Executive Committee

Immediately following the Directors Meeting the newly elected Executive Committee met briefly for the purpose of electing such officers of the Association as are elected by this body. The results of this election follow:

Secretary-Treasurer, Mr. Fred M. Jacobs. (Re-elected.)

General Counsel, Major Charles E. Pledger, Jr., Cm1C USAR. (Re-elected.)

Editor, Lt. Col. Harold B. Rodier, Cm1C, Ret. (Re-elected.)

Associate Editor, Colonel L. Wilson Greene, Cm1C USAR. (Re-elected.)

Annual Meeting

The first session of the Sixth Annual Meeting convened on Friday morning, May 11th, President Lawson presiding. There was ample discussion of the affairs of the Association, but as this phase of the session closely paralleled the business of the Directors Meeting, and as the conclusions reached were substantially the same, no detailed report is considered necessary.

Procurement

There was an animated discussion of procurement problems in which there was brought out the gap between the pre-crisis procurement planning of the Corps and the practices followed. There was discussion of cases where bids were submitted and accepted which were palpably too low, and it was pointed out that such bids were either submitted in bad faith, i.e., with a view to getting the contract first and counting on finding a profit in the course of renegotiation, or of a lack of understanding of the realities of the transaction which might well make the capacity of the bidder to execute the contract suspect. After much exchange of views on these subjects General McAuliffe spoke informally in response. He pointed out that whereas under the law it was up to the procurement authority to pass upon the ability of the contractor to fulfill a contract, in respect to his technical know-how as well as to plant capacity and financial situation, that the procurement agency could not enter into or pass upon the question of whether or not a contract could or could not prove profitable. He called attention to the complex problems created by the nature of the partial mobilization, and their effect upon procurement.

Medals and Awards

The Association's program of awarding medals and certificates to outstanding students at ROTC schools and Chemical Corps schools came in for much discussion and praise. It was agreed that the program is constructive and highly worth while. Winners of the recent awards made are pictured elsewhere in this issue.

Afternoon Session

The business having been concluded at the morning session, the afternoon was devoted to hearing from the speakers, General McAuliffe, Mr. Merck and General Maas. Their talks are reproduced fully on succeeding pages. When they have been read, those who did not attend the Annual Meeting will readily understand how enthusiastically they were received.

Cocktail Party

At the next social event, the cocktail party that afternoon, the general theme was the brilliant success of the meeting, and appreciation of the talks made that afternoon. Once more, the party lingered on and on.



NEW FACES IN THE EXECUTIVE COMMITTEE

Left: COLONEL E. R. Baker, 7th Vice President, Chairman, War Mobilization Planning Committee.

Middle: LT. COLONEL E. E. FREDERICK, 3rd Vice President, Chairman, Organization and Membership Committee.

Right: REAR ADMIRAL N. S. PRIME, 6th Vice President, Chairman, Research and Development Committee.

President Lawson was re-elected. In the foreground are Mr. Smith, General Maas, Mr. Merck and General McAuliffe.

Lieutenant General I. H. Edwards, USAF.

The Banquet

The Claridge Hotel had provided a colorful setting for the banquet; and again, as at the previous Annual Meeting at Virginia Beach, Mr. K. George Irving, of Tyler, Texas, donated a profusion of roses for the tables. After dinner, President Lawson presented the sole speaker of the evening, Lieutenant General I. H. Edwards, Deputy Chief of Staff for Operations, U.S. Air Force. General Ewdards' topic was "The Current Military Situation." The scope of his talk was infinitely broader than this title suggests; it is reported fully in this issue and our readers will find that it contributes notably to their understanding of the wor situation. It is certainly as current as the JOURNAL goes t press as it was the day it was delivered.

With the conclusion of General Edwards' speech, Pres dent Lawson's gavel descended and he declared the Sixt Annual Meeting adjourned.

For a splendidly successful Meeting, the thanks of th Association are due to Chairman Bob Norman and h Committee, to Assistant Secretary-Treasurer Mrs. Miria Rappoport, and to the management and staff of the Cla idge Hotel.

AFCA DINNER, DIRECTORS MEETING DURING ACS DIAMOND JUBILEE

Attention members who will be in New York for the Diamond Jubilee Meeting of the American Chemical Society the first week in September or for any other reason: The Armed Forces Chemical Association is holding a dinner at the Hotel New Yorker on Thursday, September 6 for the enjoyment and friendship renewal of our members, wives and other guests who will be in New York at that time. There will be a social hour with refreshments preceding the dinner.

Preceding the dinner there will be a meeting of the Directors, AFCA, who will be advised of the time and the place of the meeting.

Our dinner speaker will be J. Davidson Pratt, Director and Secretary, the Association of British Chemical Manufacturers, 166 Picadilly, London. Mr. Pratt is a leading figure in the chemical warfare organization since World War I. He is a member of the British Chemical Defense Board as well as Chairman of two of its committees dealing with Offensive and Defensive Equipment respectively.

The charge for the social hour and dinner will be $10.00 per person. Please send in your reservations to Mr. Fred M. Jacobs, AFCA National Headquarters, 1129 Vermont Avenue, N.W., Washington 5, D.C.

HOWARD S. MCQUAID, *Chairman*

The Military Situation TODAY

ADDRESS DELIVERED AT ANNUAL MEETING BY LIEUT. GENERAL I. H. EDWARDS, USAF, DEPUTY CHIEF OF STAFF FOR OPERATIONS, USAF.

During recent weeks our military policies and, to a considerable degree, our military situation, particularly in the Far East, have been the subject of the most searching and frank examination by the Congress of the United States. The citizens of this country have read in their newspapers what have been up to now closely guarded secrets of our military situation and the governmental policies behind it.

At the risk of belaboring the subject upon which you may have sensed some disagreement among our top military leaders, and in the face of the authoritative sources you can gather from the daily press—I will still be so venturesome with my announced subject. Please bear with me if my remarks seem too elementary or repetitive in the light of the highest level military opinion you have become familiar with recently.

A few years ago military situations could be shown on a map. In those days a briefing officer could give a clear and simple picture of the situation by standing beside a big map and using a pointer. He could indicate the strong military positions, the best approaches to those positions, and the possible avenues of attack or of retreat. Even the progress of a great war could be shown by a few lines on a map, with the forces of each side drawn up along the lines of contact.

In those days I could have brought with me a big map and a pointer and could have given you a clear picture very quickly. I could have said to you *we are along this line, the enemy along that line;* for each force would have been deployed in a manner easy to describe. But warfare has changed significiantly in the past few years, far more than most people understand—more perhaps than many of us military people understand. The general military situation —land, sea, and air—can no longer be pictured comprehensively on any flat map.

Tonight I would need a globe—a globe big enough for all of us to see. There are very few globes today that are big enough even for purposes of instruction. The largest I have seen is a partial globe we have created for our own use in planning at Air Force Headquarters. It is five feet in diameter and it shows many geographical facts that cannot be shown accurately on any one map.

I hope someone will build a room like a small planetarium under a dome-like ceiling, with the geography of the Northern Hemisphere displayed on the ceiling. If we were assembled in such a room tonight, I could illustrate my brief remarks very well. You gentlemen belong to a most ingenious profession; perhaps one of you will design and construct a simple enclosure that will enable people to sit in the center of the earth and see it from the inside—for the first time on a large scale—as it really is.

Lacking such a representation of the facts of world geography, I shall have to ask you to imagine with me tonight the great globe itself. The dominant feature of that globe is the continent of Eurasia. This great continent stretches almost half-way around the earth, and extends from the North Pole to the Equator. It is the greatest single unit of our planet's basic resource—land—and it contains three-fourths of the earth's entire population.

Almost the entire northern half of the continent of Eurasia is occupied by the most extensive nation on earth, the Soviet Union. In recent years that nation has extended its power and influence over several nations of that Asiatic peninsula that we call Europe which were formerly free and independent. It has also attached to itself by military alliance and political influence most of the southwest quarter of Asia, and the most populous nation on earth—China.

Looking at our hemisphere, then, from the center of the earth—or some point far above the North Pole—we can imagine that the dominant color is red, and that the edges of the red area have advanced like a prairie fire to the west and to the southwest. This spreading flame has been checked by a backfire in Yugoslavia, and has been halted within the nations of Germany and Austria by political and economic resistance. It has been checked in Greece by armed resistance, and has made no progress into Turkey because of the stubborn defiance of the Turkish Government and the Turkish people. To the north on the Scandinavian Peninsula the red flame has not succeeded in consuming the rugged Finnish nation and the Scandinavian countries. So, to the west then there has been little or no advance during the past four years, despite the overwhelming military superiority which the Russians possess in that area.

As you know, Soviet Russia today occupies a great area described to geopoliticians as the heart-land of the world island, a very defensible military base, and the most suitable base for any world-wide aggression, operating as she does from interior lines and compelling her adversaries to oppose her on peripheral lines of world encircling dimensions. In this heart-land is disposed the greatest land army on earth, consisting of something like two hundred divisions of well-trained soldiers backed up by a reserve military manpower pool several times that strength.

It is generally conceded that this great army has as of today the potential of marching to the coasts of the Eurasian continent in almost any direction it chooses to march. No force that exists today on the ground is capable of stopping such a march. Such a force is not generated by the act of signing treaties. It takes time to raise and train divisions and armies of the magnitude to do that job.

One of the principal and immediate aims of the North Atlantic Treaty Organization is to build a ground army which could successfully oppose any attempted blitzkreig of the Russian army toward the west. Whether the effort required for the nations of Western Europe to succeed in this endeavor will be prompt enough or strong enough

(Continued on Page 52)

CHEMICAL MOBILIZATION

ADDRESS BY GEORGE W. MERCK, CHAIRMAN OF THE BOARD, MERCK & CO., TO THE ANNUAL MEETING OF THE ARMED FORCES CHEMICAL ASSOCIATION, HOTEL CLARIDGE, ATLANTIC CITY, MAY 11, 1951.

One of the ironies of this troubled period is that we didn't have time to become *unprepared* for war—in the sense that we were unprepared in 1939.

Industrially we came out of World War II with a gigantic apparatus for furnishing the materiel of total war.

Most of us thought in terms of retooling for peace, of a short period of tremendous demand followed by a bust and depression, or at least by a gradual tapering off into middle-of-the-road peacetime production.

But we haven't had a chance to bust. The civilian demands dammed up during the war kept industry racing ahead at a full gallop. The signs of demand easing off were just beginning to show themselves when the Korean war broke over our heads, and here we are—at full gallop again.

Peace meant expansion instead of contraction. The Federal Reserve Board reported industrial production for 1950 at 200 (using the 1935-39 average as 100); by March of this year the Index had risen to 220, and it is expected to hit 235 or 240 by December. Some of the men who marshall statistics have even stopped using the conventional 1935-39 base for calculating such things, and are replacing it with 1948 as a new "normal year."

GEORGE W. MERCK
Chairman of the Board, Merck & Co.

The chemical industry has been in the forefront of this rush to meet peacetime needs and the demands of limited and potentially total war. Whereas plans for the expansion of all industry call for a jump in dollar outlays of 45 per cent over last year, planned expansion in the chemical industry for 1951 is a scheduled 59 per cent over 1950. Our envisaged capital spending for 1951 is $2,140,000,000—the largest contemplated for this year by any of the manufacturing groups and $795,000,000 more than steel, the nearest manufacturing competitor. We shared with the rest of industry the apprehensions raised by the signs of recession in 1949. Nevertheless the chemical industry showed a resilience and a vitality beyond that of any other of the basic industries.

The effect of this healthy condition is that our industry is better prepared today than at any time in its history to meet the demands of a strong national defense.

At the end of World War II, for example, many of us feared there would soon be serious overproduction of chlorine. But that surplus never materialized, and the rumblings of total war last year found the industry in full production. The fact that plans are reported to be in the making to step up U.S. chlorine production by at least 25 per cent by next April indicates that this part of the chemical industry has not rested on its oars in our brief respite of peace.

Penicillin production capacity, to take an example from my own field, had apparently far overrun the clinical needs of a civilian economy when the outbreak of the Korean war caused an increased world-wide demand that soon called for major expansion of facilities (and this no doubt will start another cycle toward over-production).

The point is that, in general, we are able—for better or for worse—to take the expansion in our stride, even though it causes some of us to breathe a little hard and to feel some sharp muscle pains.

That does not mean that we have no difficulties. Part of our new production facilities is used in making products which, although unheard of before World War II, are now considered necessities (for example—streptomycin and cortisone). Such necessities cannot be even temporarily put out of production by products with a higher priority solely because of war needs. The nation's health is more than ever the nation's strength. This with the nation's mobility on the land and on the sea and in the air insures an ability and an agility to marshall its productive forces where its strength will count "mostest and fustest."

As Vannevar Bush has pointed out so poignantly many times: We cannot hope to match the forces which may be arrayed against us solely in manpower; in mere nose-count we will be far outnumbered. *We can prevail only by a superiority in the use of weapons, of defense and of offense, that will multiply our manpower effectiveness beyond anything an enemy can achieve.*

The advances made by scientists in the chemical industry are of immense importance to progress today. How successfully their research is safeguarded and encouraged; how efficiently it is brought to fruition in our production facilities; and how effectively we can fit such advances into the general economy of war or peace—these will spell the difference between victory or defeat.

It is becoming clear to every chemist and production engineer that his experiments are of moment not only to his company but to his country—and to every man, woman and child. It should be fairly obvious that no manufacturer works solely for himself and his stockholders.

I honestly believe that the American public really recognizes how much it depends upon the abilities of industrial leaders and scientific experts to carry out the mobilization polices. The frank antagonism between Government and business so prevalent in the recent past is giving way to a

(Continued on Page 55)

"We look upon the chemical industry as a brother service, not just the producers of our munitions and equipment."

A BROTHER SERVICE

By Major General A. C. McAuliffe,
Chief Chemical Officer, U.S. Army

It is a distinct privilege and a genuine pleasure for me to appear before the Armed Forces Chemical Association and to discuss with you matters of vital importance to all of us.

During the early days of World War II, the miracle of America's industrial production for war confounded our enemies and astounded our friends. It is happening again today. Thus, it is a signal honor for any soldier to appear before a group that represents so well that management sector of this great industrial system which is that Nation's most powerful weapon of offense and defense.

A year ago, when you met at Virginia Beach, this Nation was at peace. We had high hopes that the "cold war" would be but a battle of words. A few days after your meeting, however, the situation changed entirely. Suddenly, we were faced by armed aggression as a climax to the cold battle between freedom and tyranny—a conflict between democracy and totalitarianism—a battle for men's minds. At once American lives were fulfilling our obligations to the United Nations and the ideals of freedom.

Once again, the Chemical Corps and the chemical industry unite in a partnership to carry out our mutual responsibilities. Your attendance at this meeting bespeaks your interest in this partnership. The Armed Forces Chemical Association has fostered well our cohesive relationship. We of the military appreciate with you of industry the Association's efforts to provide us with the opportunity for a meeting of minds—a meeting designed for a better understanding of the problems besetting both of us.

From a geographical standpoint, the Korean conflict would appear a small scale war, especially in the light of the number of nations involved. But we must not delude ourselves, or feel assured of our well-being, merely because the area and the extent of the fighting have been limited.

The invasion of South Korea aroused our Nation out of a postwar lethargy.

From experience we have learned that without industrial preparedness, military forces alone are impotent. In the past, as it will be in the future, our great productive capacity and the proven ingenuity of our men of industry assure us of the means we need to attain ultimate victory. We in the military are fully aware that preparedness planning, with all its attendant advantages, would be impossible without the active and enthusiastic cooperation of private industry.

Your superior efforts in aiding the Chemical Corps during World War II, and your wholehearted assistance in developing and producing the materiel to meet the enemy's challenge on world-wide battlefronts, will pass down to posterity as one industry's outstanding achievement.

Not only did your efforts result in such a stockpile of the unconventional munitions that the enemy dared not start a gas war, but also it made stronger the realization that science and the military must collaborate in times of peace if we would be ready in time of war.

I believe that between the chemical industry and the Chemical Corps there exists a bond stronger than that which links any other industrial-military group in the national defense setup. Certainly without your wholehearted cooperation, the limited Chemical Corps staff could not have accomplished the jobs already done.

As far as our Corps is concerned, we look upon the chemical industry as a "brother service," not just the producers of our munitions and equipment. The very nature of our mission is such that we could not hope to fuifill its obligations without the aid of industry's scientific and production "know-how."

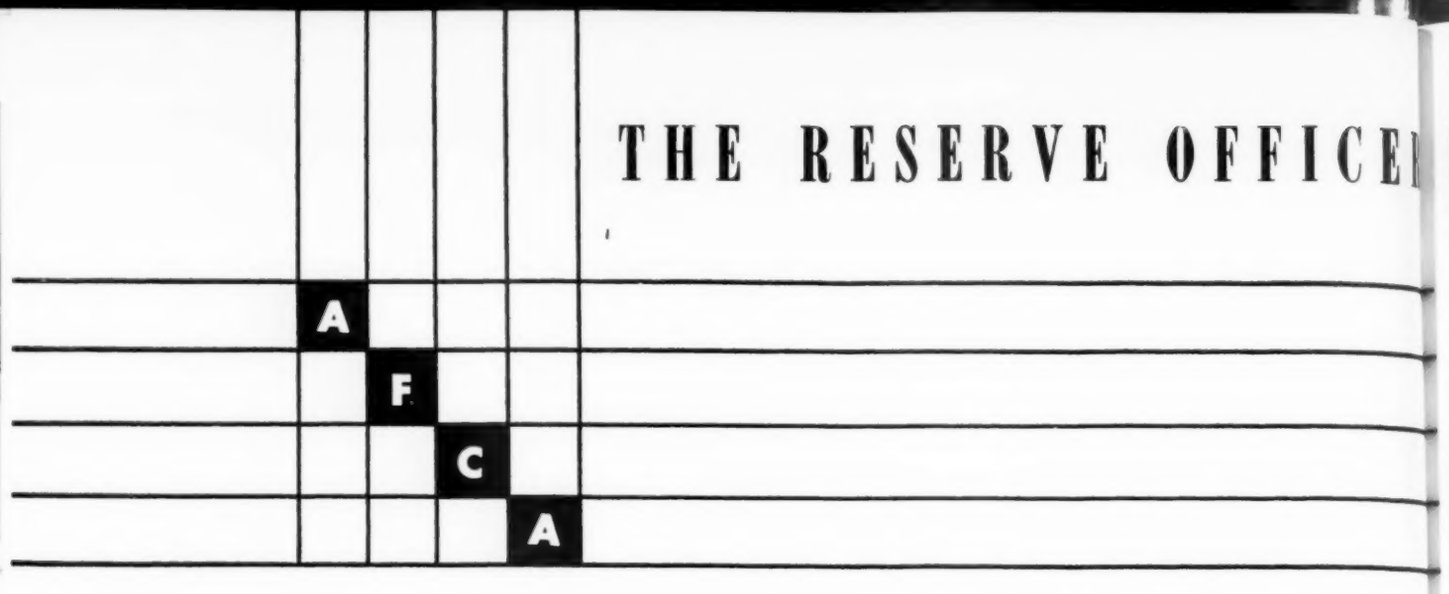
Because we must be constantly improving munitions that may never be used, we can not hope to meet our full requirements, in times of necessity, from stockpiles of existing material which grows progressively obsolete. For, as the capabilities of potential enemies grow with the development of new weapons, we must provide means of countering them. The Chemical Corps' research and development program is designed to meet these requirements. It is an expensive process, but the results obtained in the last war testify eloquently to the soundness of the investment.

In our approach to this problem we have abandoned our former relationship witn industry under which the Corps set forth detailed specifications for the development of desired items and which we relied upon industry to meet. As a result of past experience, we now establish objectives rather than detailed specifications.

Thus we have entered into a partnership which permits us to keep industry constantly aware of our changing requirements and we, thereby, draw in the most efficient manner upon the accumulated technical knowledge and ingenuity of our civilian partners in the development of military equipment.

One of the Corps' biggest problems is that only 10 per cent of the items which we call upon industry to provide for

(Continued on Page 46)



ADDRESS OF GENERAL MELVIN J. MAAS, U.S.M.C., AT THE ANNUA MEETING, A.F.C.A., FRIDAY AFTERNOON, MAY 11, 1951, TRIMBLE HALL CLARIDGE HOTEL, ATLANTIC CITY, N. J.

GENERAL MELVIN J. MAAS: Dr. Lawson, General McAuliffe, Mr. Merck, ladies and gentlemen: I was tremendously interested in George Merck's remarks. He talked to you straight from the shoulder and he said some things that need to be said and need to be listened to. I'm going to address a good deal of my remarks to the questions which he has raised, because they have to be answered.

The Koreans invasion has created some problems for this country that had never been anticipated, and therefore, had never been planned for, but for which we must find the answers, because the problem created by partial mobilization threatens not only the future security of this country, but perhaps, our ability to even survive as a nation. Our traditional system in this Republic is for a relatively small, highly skilled professional military force, backed by a large civilian reserve with military training. Now, that whole system is threatened.

What happened upon the advent of partial mobilization? When our national policy was determined to be one of intervention in Korea, certain forces were set in motion. We had to immediately augment our regular military peacetime forces and we had to augment them in combat. There was only one way in which this could be done. That was to call back the veteran of World War II, who had just gotten home and gotten settled in his business, and gotten married and was starting his family. Rudely and ruthlessly, we had to route him out again and send him back out into the military forces, because we had to have experienced, trained military personnel and that was the only source, we didn't have time to train new ones. It was a terrific hardship—on the reservists there isn't any question about it. We needed only a percentage of the total of the two and a half million reserves we had, but we had no plans for such a partial mobilization, since all our plans were for total peace or total war, we were just caught absolutely short.

Every reservist was subject to call because the military forces had no plans in being as to what units they would call up for this kind of a situation, nor what individuals were to be called up. They didn't know even how many they were going to call to begin with—they had to see how it developed, so that they couldn't even set quotas of reservists to be called. They knew they were going to have to call up divisions of the National Guard and perhaps, divisions of the Reserve Corps, but they didn't know which ones to call. It took a study of the readiness status of those units an also of the military requirements, as to what types of unit would be needed, because there was no pre-planning.

The word went out that reserves were to be mobilized. The result was that every reservist was in a hazardou position because he couldn't tell his employer, prospectiv employer, or his partners, if he was in business or a profession, as to whether he was going to be called or not, and i so, when he might be called or for how long he'd be gone Very soon the situation developed-inevitably, where em ployers became reluctant to hire reservists—they becam reluctant to advance or promote reservists in their emplo certainly to the responsible positions—loaning agencie soon began to be reluctant, and finally, just practically t refuse to make or extend loans to reservists—then insuranc companies began to decline to write term insurance fo members of the Reserve or National Guard. Well, tha created a very serious situation. Unfortunately, '50 was th year in which the vast majority of veterans taking G. I education, graduated. Because those who were in the Re serve were unable to assure an employer or prospective em ployer of their call-up status, they just couldn't get jobs As a result of it, thousands of the most patriotic young me in this country, available and qualified, were walking th streets unable to get jobs during a time when there was a labor shortage.

I'm not criticizing anybody for it—neither the military nor the employers. But I want to tell you, that as a result of all this, there just isn't going to be any Reserve agai when this is over—not on any such basis, at least, as we've had in the past.

How long is the smart man going to remain in the Reserve or National Guard, when he finds that he has assumed an occupational handicap more severe than almost the most physically handicapped in the country? We can adjust our physically handicapped into employment and we're making marvelous strides in that field. But so far nothing parallel to that has been done for the occupationa handicap of reservists.

Now, just look at the future, when this Korean thing may be over. It won't be forgotten. The fact that we can have partial mobilization will always be in the employer's mind and in the individual's mind. Think ahead to the time when John who has stayed in the Reserve and is a very cap

able fellow is in line for promotion to head an important department in a company in competition with—Bill who didn't stay in the Reserve. Maybe John is a little more capable and the Board of Directors feel they'd like to make him the General Sales Manager, but he's in the Reserve, and the Board of Directors decide—"well now, wait a minute. He might be called at any time. You know what happened in 1950. This is too important—we've got to have a Sales Manager that's going to know the territory and know his salesmen—we can't afford . . . ". Well, Bill may not be quite as good, but Bill gets the job. How long are the "Johns" or smart "Johns" going to stay in the Reserve or National Guard?

We've tried to do something about it, and I'm going to tell you what plans we have worked out. I want to impress upon you, particularly those of you in industry who have anything to do with employment problems, what we are faced with.

Gentlemen—We are never going to beat the Russians on the manpower basis, as Mr. Merck told you—we haven't got it—they do have. They can spot us ten to one, maybe a hundred to one, and still beat us on manpower—they've got it.

We aren't going to beat them on the basis of superior quantities of weapons on hand either, because they've got the advantage—we don't have it. The Communists have got more guns and tanks and airplanes and submarines, by far, than we have. They can convert their industry—Granted, their industry yet doesn't approach ours—but they can get to a ninety percent war production. The most we ever got to at the height of World War II, was a little under fifty percent war production. In other words, only fifty percent of what we produced went into the war effort, and the other fifty percent remained for civilian use.

Now, is there a chance? Can we survive? Yes, gentlemen, I think there is one area in which we are predominant, in which we are supreme, if we just have the sense to use it. That differential is that we do have a great advantage in brains. The average American private has more ingenuity than the average officer of most other nations, because of our system—the freedom that we have—the emphasis that we put on the individual in this country and not on the state.

This great product of America—this industrial wonder of the world has been created out of the brains and the ingenuity and the imagination of young Americans of each generation. Everything that you do in your industry originated in somebody's mind. We have progressed faster than any nation in the history of the world because we have given more freedom to the individual and an incentive to using his brains.

As Mr. Merck told you, we've got to be ingenious, and we've got to manage so well, that every American must account for a hundred or a thousand of the enemy by superior weapons and the superior tactics in their employment.

Now, if we don't have a Reserve, let's see what we're faced with. There's just two courses. One, is to fall back on a dangerous American habit—That is, unpreparedness. That will never work again—not with the way wars happen and develop today. This nation will never again have an opportunity to get ready after a war starts. If we are unprepared when the next starts, we will most certainly, by that very fact, invite the war and aggression against us which will succeed. We will wind up conquered or destroyed.

The other course is almost equally objectionable. In the first place, it's repugnant to every American tradition. It probably would defeat its own purpose anyway. That is, to maintain all the time in peace as well as in war, a full wartime standing military establishment. That won't work either. First, the cost of that would very soon do what no foreign aggressor has ever been able to do—it would defeat us, but from within. Such a budget might permanently be—the military budget alone might run seventy five to a hundred billion dollars a year. No, that's an unacceptable solution.

It's unacceptable for another reason, too. But the only alternative, however, to those two courses is to continue the system of a highly skilled professional force backed by a large, well trained civilian military reserve.

Let me point out to you that if we attempted either of the other courses what would happen to us anyway. If we were to maintain—leaving out the cost item—the size military force perpetually that we would need to fight a war at all times, what would happen? Well, the reason that our industry has become the marvel of all ages is because of the opportunity that young Americans have to contribute freely of their imagination and their initiative and their ingenuity.

If the intelligent young men of the country are channeled into the military force in order to support a permanent establishment of ten or fifteen million, which is what it takes to fight a war—it just won't leave for industry and the sciences enough of the intelligent young men to keep up this marvel that is America.

On the other hand, if we channel them all into industry and let the military wither and dry up again, what will the military be left with—just that, the leftovers, and they won't be good enough to lead us in defense of the country.

Therefore, it all adds up that our future is dependent upon having a Reserve, and an effective Reserve, so that in peacetime, the continuing development of the ingenious young American with imagination and initiative will continue to contribute to the continual growth of this nation, to the continued advancement of the sciences and of all of the things that go together to make America, but at the same time, receiving military training so that when the time comes, the proper proportion of the intelligence of this country be channeled into the military to also help lead us in the military victories. That way, we can use our brains twice.

If we can find a solution along those lines, America can continue, both to contribute to the world and to the advancement of civilization by increasing its standard of living through our great marvel of industrial progress, and at the same time, can remain so strong militarily that either no

(Continued on Page 43)

THE CORPS' 9TH CHIEF

Twenty-six years ago a Calvary lientenant sat down and wrote a letter that was destined to result in much bigger happenings than he anticipated. The letter was to the office of the chief of the Chemical Warfare Service, Major General Amos A. Fries. It inquired whether it would be possible for the writer to be detailed into the Chemical Warfare Service for a tour of duty. The lieutenant had just finished a unit gas course and the potentialities of chemical warfare interested him.

Little did the lieutenant realize that before his military career ended, he would be signing himself, Major General E. F. Bullene, Chief Chemical Officer, Department of Army.

When President Truman relieved General MacArthur of his Far Eastern command in April, he started a chain-reaction that resulted in General Bullene's becoming the Chemical Corps' ninth chief officer. General Matthew B. Ridgway, 8th Army commander in Korea, replaced General MacArthur; Lt. General James A. Van Fleet, Second Army commander, took over General Ridgway's duties; and in May, Lt. General E. H. Brooks was assigned as new commanding general of the 2nd Army.

To fill General Brooks' job as Assistant Chief of Staff, G-1, Personnel, for the Department of Army, Major General A. C. McAuliffe was chosen. General Bullene, who had been serving as General McAuliffe's deputy since February, was nominated by President Truman to become Chief Chemical Officer with the rank of major general on May 23. The Senate confirmed the nomination on June 20th, 1951.

General Bullene summed up the feelings of all Chemical Corps personnel when he soberly stated: "The Corps is losing a wonderful officer," as news of the change broke. It was a simple statement, but one that covered a world of meaning.

"Tony" McAuliffe, famed for the leadership he displayed in the defense of Bastogne in the winter of 1944-45, and his "Nuts" reply to a German demand for surrender of the encircled American troops in the Battle of the Bulge, had revitalized the Chemical Corps.

General McAuliffe was recalled from command of the 24th Infantry Division in Japan in October, 1949, to assume command of the Chemical Corps. He is credited with having done a magnificent job of bolstering the morale of the Corps, with speeding up the research and development program, and chemical warfare production. He stressed the need for military-civilian cooperation in the Corps' peculiar field, and gained high recognition from the nation's outstanding scientists.

His leadership resulted in the Corps and its "brother service," the chemical industry, swinging into partial war production with ease after the outbreak of fighting in Korea. His own personal feeling of "I'm not a desk soldier," did not keep him from putting all of his effort into making the Corps the type of efficient organization he felt it should be.

The new Chief has a well-rounded military background that especially fits him for the assignment.

In 1945, Major General William N. Porter, then chief of the Corps, wrote of General Bullene: "His long and distinguished military career has been marked by deeds accomplished and tasks performed in a superlative fashion. His creative ability, enthusiasm and prodigious effort, combined with his talent for leadership, have resulted in great benefit to this Service."

Indicative of this leadership is one of the outstanding results he achieved as commander of the Chemical Warfare Service Unit Training Center and Replacement Pool at Camp Sibert during World War II. When General Bullene (then a colonel) assumed command of the training center, it was at the bottom of the Army Service Forces list in marksmanship ratings. Within three months, through new methods he initiated in the training and much hard work, the marksmanship rating topped the list. While he served as commander of the training center, it never fell below the number two spot. Another feather in his cap was the fact that during his tenure, none of the units leaving Camp Sibert failed to pass the Port of Embarkation inspections.

Egbert Frank Bullene—known as "Bub" to his intimates— was born in Salinas, California, in 1895. His father now lives in Pacific Grove, a community a few miles west of Salinas bordering on the Pacific Ocean, and where General Bullene hopes to live "when, and if, I ever retire."

In 1917, he was graduated from the U.S. Naval Academy at Annapolis. As Midshipman Bullene, he was aboard the first battleship to pass through the Panama Canal at the time of its official opening.

America was girding for its entry into World War I at

DEPARTMENT OF THE ARMY

OFFICE OF THE CHIEF CHEMICAL OFFICER

WASHINGTON 25, D.C.

As I assume the duties of Chief Chemical Officer it gives me a warm feeling of appreciation to know that I have the backing of the Armed Forces Chemical Association. The efforts of this organization to aid the Chemical Corps in achieving its objectives are becoming more apparent. It is my intent to continue to promote the fine feeling of cooperative spirit that exists between the Corps and the AFCA.

E. F. BULLENE

Major General, USA

Chief Chemical Officer, D/A

the time the class of '17 graduated from the Academy and there was a need for Army officers. This led to his being commissioned as a lieutenant in the Calvary, and in March, 1918, he sailed with the 15th Cavalry for France as one of the first 100,000 troops sent to Europe.

General Bullene holds the distinction of being one of the few—if there are any others—officers who have trod a ship's bridge in campaign hat and breeches as a part of his official duties. While en route to France, it developed that his transport was short of ship's officers. As an Annapolis graduate he was pressed into service, and had the unique experience of standing a naval officer's watch while wearing Cavalry boots and spurs.

His naval training again had a bearing on his duties when the unit reached France. A man cannot attend the Naval Academy four years without gaining considerable experience and knowledge in gunnery. Once again he was called to fill a shortage of officers . . . this time in a Field Artillery regiment. He saw action in the Aisne-Marne, Vesle, Chateau-Thierry, and Meuse-Argonne engagements. He was wounded in action, and during the Argonne fighting he took over a Field Artillery battery when its commanding officer was killed. His leadership as a battery commander earned him a promotion at the age of 24.

After the Armistice and before sailing home General Bullene attended the French Army Artillery School at Lavaldon, France.

Between 1919 and 1925, he served at a number of Cavalry posts throughout the nation, including a tour of duty as post and personnel adjutant at the U.S. Disciplinary Barracks on Alcatraz Island in San Francisco Bay.

In September, 1925, his letter of inquiry had resulted in the addition of the name of Bullene to the roster of officers detailed into the Chemical Warfare Service. After attending the Chemical Warfare School he became adjutant of the First Gas Regiment, then stationed at Edgewood Arsenal.

He entered the Army Industrial College, Washington, D.C., in September, 1927, and was graduated the following June. And, on August 28, 1928, he was transferred into the Chemical Warfare Service with the rank of Captain.

His first assignment as a full-fledged CWS officer was in the Office of the Chief as a member of the Training Division Staff, and in February, 1931, he was assigned to the Philippine Department, as commanding officer of the Fourth Chemical Company stationed at Fort William McKinley. During his two years' tour in the Philippines he also served as chemical officer of the Philippine Department. During this time he drew up a chemical defense plan for the island of Luzon. His plan was so well received that in October, 1932, he was ordered to China, where he was to prepare a similar plan for the possible defense of the Tientsin area. The need for such a plan was imperative for at that time the Japanese were starting their invasion of China.

In mid-1933 he returned to Edgewood Arsenal to take the field officers' course at the school, and then to serve as assistant executive officer and recorder for the Chemical Warfare Board. In August, 1936, he entered the Command and General Staff School at Fort Leavenworth, Kansas, and on May 1, 1937, was promoted to major. Upon graduation from the school he was named to the staff and faculty as chemical instructor.

A year later he entered the Army War College, Washington, D.C., and upon graduation in June, 1940, was assigned as commanding officer of the 2nd Separate Chemical Mortar Battalion at Edgewood Arsenal. By the time General Bullene was promoted to lieutenant colonel on October 25, 1940, the total strength of the troops and various units under his command gave the unit an appearance of a regiment more than a battalion.

Immediately after Pearl Harbor, he was assigned as chemical officer for the Armored Force and stationed at Fort Knox, Kentucky. While serving in this assignment, General Bullene headed a series of tests to determine the effects of persistent gases on armored vehicles, and devised extremely effective and practical procedures for decontamination in the field. He also made several recommendations for new equipment which were adopted and would have proven a decided advancement in defense against chemical attack had gas been used in World War II against armored vehicles. On February 1, 1942, he was promoted to the rank of colonel.

In September, 1942, he was recalled to the Office of the Chief to head the Training Division, and six months later he was named commanding officer of the training and re-

(Continued on Page 54)

CHEMICAL MORTARS IN KOREA . . . . .

By Lt. Col. Edgar V. H. Bell, CML C*

This report on the Korean operations of the 2nd Chemical Mortar Battalion can only be a partial one. The rest of the story is being hammered out every day by the 4.2 mortars. The complete history of the campaign must wait until the last Red Chinaman is driven from Korea.

The Battalion arrived in the theater after the breakout from the Naktong Bridgehead. The United Nations Forces were on the loose; Seoul had been recaptured and armored columns were crossing the 38th Parallel. The moment of complete victory seemed close at hand. Some of our young "hot bloods" were moaning their fears that we would never get up in time to shoot. They now know different for the 2nd Chemical Mortar Battalion has already served under three flags—American, ROK, British—in the campaign.

The Battalion debarked at Pusan on 9 October. A week was required to unload the equipment from six cargo vessels and to prepare it for use. Orders were received, assigning the Battalion to the Eighth U.S. Army.

On 16 October, with all equipment in order and combat loaded the Battalion left Pusan on its long trek to the north. Despite terrible road conditions, hopeless traffic jams and minor guerilla activity, the Battalion closed into a small settlement about ten miles north of Seoul on 18 October.

Here we received orders attaching us to I Corps. Gasoline was in short supply but we managed to secure enough to fill our tanks the night of the 19th and the Battalion rolled North again at 0500 on the 20th. That night we closed into a bivouac area below Pyong-Yang, the capital of North Korea. I Corps attached the Battalion to the 10th A A A group, which was the divisional artillery of the 1st Republic of Korea Division. One mortar company was placed in direct support of each of the ROK regiments.

The units were married up on the southern outskirts of Pyong-Yang on 21 October. The city was taken with very little resistance and the 1st ROK Division moved north to Sunchon and made contact with elements of the 187th U. S. Airborne regiment which had dropped there a few days earlier.

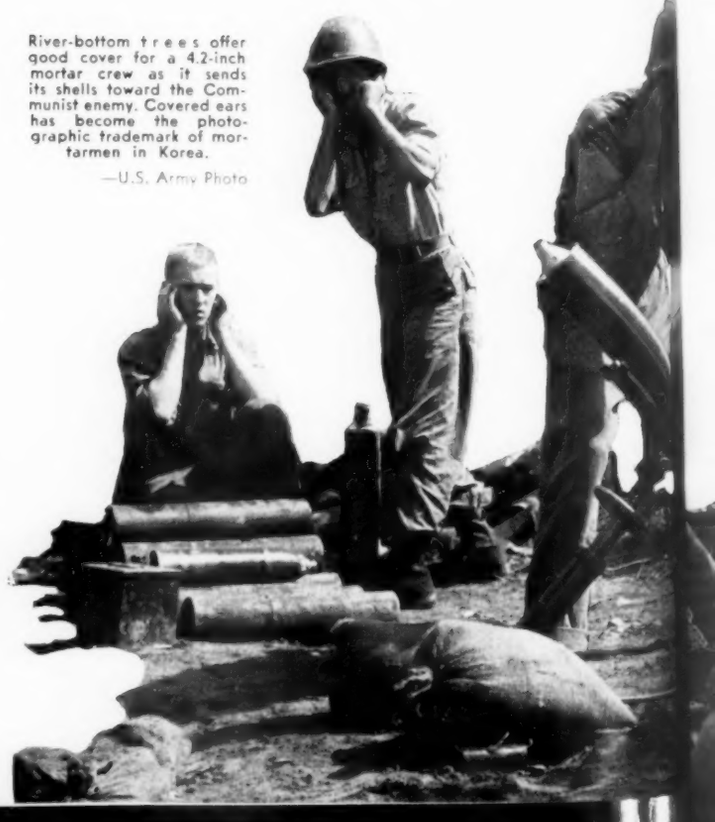
The 1st Division again pushed north taking Kunu-ri then Yong-Boyan. Up to this point, the war had been quite easy, resistance was light, the weather was mild and the principal operations of the Battalion consisted of continual reconnaissance with very little shooting and of the mass transportation of the ROK infantry on our trucks.

Near Yong-Boyan, the resistance stiffened but was brushed aside and the 1st ROK Division moved north again, forded a large river and took the town of Unsan. There we were stopped, cold. At once it was obvious to everyone that we had bumped up against a strong and quite different defense. The enemy held commanding terrain and he had organized it well. Counter attacks were launched against us and in force. These were well planned and led with skill. Early in the fighting at Unsan, the officers of 1st ROK Division believed the enemy to be Red Chinese but their claims were ridiculed at first.

The situation became increasingly sticky. On our right, the 6th ROK Division had a regiment badly cut up and we lost all contact in that direction. Nor had we any contact on our left. The enemy attacked in increasing force and intensity. The 1st ROK Division pulled in its flanks for better security. On the morning of 1 November, the 8th Cavalry Regiment, 1st U.S. Cavalry Division, moved into Unsan to assist the ROK Division.

River-bottom trees offer good cover for a 4.2-inch mortar crew as it sends its shells toward the Communist enemy. Covered ears has become the photographic trademark of mortarmen in Korea.

—U.S. Army Photo



*Col. Bell was in command of the 2nd Mortar Battalion during its training at the Army Chemical Center, Md., and led it in battle until February of this year, when he was returned to the States to give experienced advice in the training of Chemical Corps troops. He is now S-3 of the Army Chemical Training Center, Fort McClellan, Alabama.

The 8th Cavalry Regiment moved into positions on the division's left, replacing the 12th ROK Regiment which moved with our Company C to protect the division's right rear. The 11th ROK Regiment with our Company A in direct support, was on the division's right flank guarding the ford. The 15th ROK Regiment with Company B in direct support held the center.

During the night of 1-2 November, the Chinese Communist Forces launched a co-ordinated attack in great force and our losses were heavy.

Company A, with the 11th ROK Regiment, also played a tremendous part in this battle. The situation was fairly quiet during the early part of the evening but about midnight the blow fell. When the 8th U. S. Cavalry and the 15th ROK Regiments were knocked out earlier in the night, all routes of escape were closed except the one across the ford which was guarded by the 11th ROK Regimental Combat Team. The South Korean Soldiers put up a good fight and Company A supported them to the bitter end. Defensive fires were started at about 2300 hours and at ranges over 3500 yards. The 11th ROK Regimental Combat Team was enveloped on both flanks and its center pushed back relentlessly. The final protective fires were laid down by Company A at 0430 at a range of 600 yards. Immediately after this last mission was fired, the Reds broke through. The last remnants of South Korean Infantry was completely swamped. Company A lost much of their equipment during this fighting, but the mortarmen fought with great determination and succeeded in cutting their way out, picking up a few of their vehicles as they came.

There were many acts of individual heroism during that terrible night. Elements of the 2nd Chemical Mortar Battalion, in addition to their own wounded, brought out scores of 8th Cavalrymen and ROK infantrymen. The splendid

Their 4.2-inch mortar already emplaced and ready for action, a pair of mortarmen work together in digging a foxhole in the rocky Korean soil, near Kagae-dong.

—U.S. Army Photo

A graphic combat photo shows the routine of a 4.2-inch mortar crew in action. Man on the right holds his "gunners' sight" after checking the target indicators; center man loads the shell into the barrel; man (second from left) has another shell ready to pass to the loader; man on left (seated) places firing charges on shells; and directly behind the mortar, the fifth man is unloading shells from the box containers.

stand of the 15th ROK Regimental Combat Team gave the division several hours of precious time and the last ditch stand of the 11th ROK Regimental Combat Team held the ford until daybreak, when all remaining United Nations forces were safely south of the river. Without the unwavering support of the 2nd Chemical Battalion's 4.2 mortars, neither of these tasks could have been accomplished.

With the first light of 2 November, the Battalion licked its wounds and reorganized to continue to fight. Company C had come through unscathed. Company B had two platoons left with enough equipment to operate. Company A had lost most of its equipment and was no longer of combat value. Neither was the 11th ROK Regimental Combat Team for that matter, so all came out even. Company B was built up in strength by volunteers from the survivors of Company A, and the mortars remained in direct support of the two remaining regiments of the 1st ROK Division.

The Eighth U.S. Army ordered all United Nations Forces to pull south of the Chung-Gang River. An orderly withdrawal was accomplished and the 2nd Chemical Mortar Battalion reached the south shore of the river near Anju the night of 4 November. The Battalion along with the rest of the 10th A A A group, was relieved of attachment to the 1st ROK Division and attached to the 24th Infantry Divi-

(Editor's Note: The following information regarding the Second Chemical Mortar Battalion is extracted from an official British Army Newsletter concerning United Kingdom troop action in Korea during the week ending 28 May 1951. The Journal wishes to thank Lt. Col. P. H. A. L. Franklin, British Army Liaison Officer stationed at the Army Chemical Center, Md., for making this information available.)

". . . . Following an eight-hour softening up barrage from New Zealand and Canadian Artillery, the Canadian gunners' first combat shoot in Korea, the British secured hills overlooking the vital Seoul-Shunchon Highway by Sunday evening against only limited enemy resistance . . . .

"The advance was pressed forward, through heavy rain showers on Monday, across the highway. The Australians met no resistance whatsoever but the Scottish Borderers on their left, found opposition increased as they pushed higher into rain swept mountains. Their approach to a hill summit was contended bitterly, but when the Scotsmen, under covering fire from Australian machine guns on an adjacent hilltop, fixed bayonets and charged up the last few feet of the steep mountainside and over the top, the Chinese broke . . . .

"Whilst New Zealanders, with Canadians on either flank, made fast and unhindered progress onto higher features Tuesday, Chinese resistance to the Borderers in the centre remained stubborn. This isolated opposition by an estimated sixty Chinese, so cunningly hidden in depth amongst ridgetop rocks which protected them from the closest shell bursts and mortar bombs, was temporarily overcome after they had inflicted a considerable number of casualties amongst (the) Scotsmen. With superior cunning and determination, and by well planned sorties, the Borderers reached to within fifteen feet of their final bayonet charge by only seventeen remaining men . . . . Throughout this day long battle the British once more received magnificent cooperation from their supporting American heavy mortars; these belong to (the) Second Chemical Mortar Battalion, United States Chemical Corps, which has fought with the British Commonwealth Brigade continuously since November last.

"Describing the bayonet charge on this hill (and) in which he took a prominent part, British Infantry Section Leader Corporal Gavin Archibald from Dunbar, Scotland, a regular army soldier in the King's Own Scottish Borderers, said, 'As we climbed the steep hillside, the Americans were dropping their bombs (mortar shells) with amazing accuracy right on the hill amongst the Communists and it was only when we got to within fifty feet of the top that they lifted their barrage. It was too late for the Chinese by then and we tore into them.' Archibald killed an enemy machine gunner with a phosphorous grenade and turned the Russian made gun on the fleeing Chinese, but it was a strange gun to him and he could not get it to fire. Later in the day the enemy counter attacked and the Borderers ammunition ran out. They were forced off the hilltop by a hail of hand grenade . . . .

"The Second Chemical Mortar Battalion, which claims its origin in the United States Second Gas Battalion of the First World War, had an outstanding record in Europe in the Second World War. The Second Chemical Mortar Battalion arrived in Korea in early October last year and since joining the distinguished Twenty Seventh British unit of the Commonwealth Brigade a month afterwards, it has, more than any other American unit associated with the British in Korea at one time or another, formed a very deep-felt friendship with the five Commonwealth units of the brigade. In fact, it is regarded by all these British Commonwealth outfits as being as much a part of the brigade as themselves. Since the Eighteenth Century, heavy mortars have been constituted into an individual unit in the British Army until one such unit was specially formed last year to support as an experiment with the British Twenty-Ninth Independent Brigade on service in Korea . . . .

"In action in Korea, each company of the Second Chemical Mortar Battalion is usually attached to one of the Commonwealth Infantry Battalions . . . . It is the proud boast of Company "Z" Commander . . . First Lieutenant (Albert C.) Huggard, a married officer with two small children who comes from Cape Cod, Massachusetts, that (the company) has, at one time or another, supported in action more combat sub-units in the 27th and 28th British Commonwealth Brigades (than any other single unit) through most often the (an Australian unit). Says Lt. Huggard, 'We have come to prefer tea to coffee and every jeep of ours has a billycan hanging from its towing hook; we even talk of 'brewing up a billy of tea now;' Officers and senior non-coms operate with the British Infantry as forward observers to coordinate the battalion's mortars with infantry company commander's combat requirements, and says Lt. Huggard, 'We get along extremely well together. Our fellows have made many friends amongst the British and I speak for all of us when I say that we are all pleased to serve with them; we rate them very high' . . . ."

No need to use loaded sand bags to ballast this 4.2 mortar here, as the recoil effect will sink the base plate into the sandy soil of a Korean path near Waegan.

—U.S. Army Photo

Sgt. Raymond Rabenhorst of Chicago, Ill., puts charges on the rounds for 4.2 inch mortar, at the front near Yongbyon, Korea. Sgt. Rabenhorst is with Co. B, 2nd Mortar Battalion, and has been in the Army for 20 years but does not wish to retire during the emergency.

sion. The 2nd Chemical Mortar Battalion was sub-attached to the 5th U.S. Infantry Regimental Combat Team and it moved immediately to the town of Kunu-ri where it went into defensive positions guarding the right flank of the Eighth U.S. Army.

For the next three weeks the Eighth U.S. Army was engaged in bringing up fresh troops, building up men and supplies for the planned Thanksgiving offensive. There was considerable fighting in the Kunu-ri sector as our forces jockied for positions from which to jump off. During a period of less than one month, the Battalion was attached to two corps and sub-attached to five divisions and with its companies, to ten regimental combat teams. While all of this was going on, the Battalion remained constantly in action. All of this shuffling about would have been very confusing but for the fact that the Battalion was quite accustomed to fending for itself and also quite efficient in supplying its own needs. Solely through its own efforts, the Battalion secured eight mortars, sufficient vehicles and other equipment to re-establish Company A on a two platoon basis and as an effective fighting force. All of this equipment was brought up by road from Pusan, a monumental taks in itself. The very day that the mortars arrived, Company A was committed. Once again we were in business with three companies, even though two of them had but eight mortars each. Personnel had been re-assigned to give all companies about equal strength per mortar. Headquarters Company was stripped down to a bare minimum.

The Thanksgiving Offensive started several days before Turkey Day. The Battalion was then attached to IX Corps and by them attached to the 2nd U.S. Infantry Division. The Division sub-attached the entire Battalion to the 9th U.S. Infantry Regimental Combat Team. We had worked previously for this fine regiment and its commanding officer was so impressed by our operations that he attached his organic heavy mortar company to the 2nd Chemical Mortar Battalion. Despite our heavy losses at Unsan, morale was high and our mortar men were full of fight. Weather continued to be good, though it was getting quite cold.

The 9th U.S. Regimental Combat Team jumped off and attacked up a river valley in a northeasterly direction. From the very beginning the going was tough, but the 9th slugged it out with the Reds and took Wonni and then a string of little towns along up the river and finally the town of Kujang-Dong. A few miles northeast of here the advance bogged down badly. Enemy resistance was fierce and there was every indication of a tremendous buildup of Chinese Reds. The situation deteriorated very rapidly. Once again the division that we were supporting had no contact with friendly troops on either flank. The Chinese attacked again and again and in increasing force. Our mortars slugged it out and all companies suffered casualties. Company C, in direct support of the 2nd Battalion, 9th U.S. Infantry Regimental Combat Team, was badly cut up one night with severe losses in men and equipment.

On the night of 26 November, the Chinese Communist Forces, having cut off the 2nd U.S. Infantry Division from all other United Nations Forces, attempted to annihilate the division. The fighting was terrific but the men of the 2nd U.S. Division stood firm though they suffered very heavy losses. On 27 November, the division withdrew in the direction of Kunu-ri. The 2nd Battalion of the 23d U.S. Infantry Regimental Combat Team and the 2nd Battalion, 9th Regimental Combat Team covered the withdrawal. Both of these infantry battalions did a magnificent job. With what was left of the 2nd Battalion, 9th Infantry, we set up a blocking position north of Wonni where the 2nd Battalion, 23d Infantry, passed through us. These rear guard actions continued until all elements of the 2nd U.S. Infantry Division had cleared into the vicinity of Kunu-ri. The Chinese Communist Forces were pushing the assault with great vigor. The 23d Infantry Regimental Combat Team took up delaying positions northeast of Kunu-ri and the 2nd Chemical Mortar Battalion placed its two remaining companies in direct support of two batallions of this regiment. They remained firing up to the last minute when orders were given by the 23d Infantry Regimental Combat Team to withdraw, saving all equipment if possible and destroying what could not be taken. The Battalion got out with all of its equipment except one quarter-ton trailer which was stripped and destroyed. A most fortunate decision on the route of withdrawal saved the Battalion from the disastrous ambush of the 2nd U. S. Infantry Division that night and the following day.

That first night on the long, long retreat was a difficult one, but the Battalion came through it in good order. Our radios worked perfectly until after dawn and the unit maintained its combat integrity. We came out along the river road, then south from Anju to an assembly area south of Suchon. We were immediately relieved of attachment to the 2nd U.S. Infantry Division and attached to 27th British Commonwealth Brigade.

In all of my experience as a mortar battalion commander in two wars, I have never had an attachment so professionally perfect as that of the 2nd Chemical Mortar Battalion to the 27th British Brigade.

We were worked, and worked hard, by them but we did not mind because our employment was always tactically sound and designed to utilize to the fullest extent the fire capabilities and flexibility of our 4.2 mortars. We quickly developed a profound respect for these Britishers as professional soldiers in the finest sense of the word. We had implicit faith in their ability to do their job and they in turn had full confidence in us. The 2nd Chemical Mortar Battalion had its own niche with the 27th British Brigade which had no heavy mortars of its own. The United States Regiments all have their own heavy mortar companies and the Chemical Mortar Companies are frequently used solely to supplement the fires of the organic mortars. With the

A pair of 4.2-inch mortars pound away at Communist strong points during the fighting near the Naktong River. The targets were located just over the hill on the left of the photo.
—Department of Defense Photo

—Army Chemical Center Photo

Lt. Col. Edgar V. H. Bell (right) checks the rifling in the barrel of a 4.2-inch mortar. The photo was taken at Army Chemical Center, Md., shortly before the Battalion sailed for Korea and just after a national magazine had published a report that a rifled-barrel, muzzle-loading mortar was "impossible" and "impactical." The editors of the magazine did not accept Col. Bell's offer to demonstrate the weapon they said was "impossible."

British, we were their organic heavy mortars and usually their light artillery as well, as the Brigade had no guns of their own.

The 27th British Brigade at that time consisted of three rifle battalions, the Argyle and Sunderland Highlanders, the Middlesex Light Infantry and the Royal Australian Rifles. It had an anti-tank troop (platoon) and some transport units. We placed Company A in direct support of the Middlesex and Company B in direct support of the Argyles. The Middlesex Battalion broke up the road block above Sunchon where the 2nd U.S. Infantry Division was ambushed and the survivors of this division passed through us to the south.

The Eighth U.S. Army was withdrawing down two main routes. To the 27th British Brigade was given the mission of covering the withdrawal along the easterly road while another British Brigade (the 29th) covered the westerly road. The 2nd Chemical Mortar Battalion was with the 27th British Brigade all the way. The two roads converged at Pyong-Yang where the 29th Brigade held the bridges while we passed through them. South of Pyong-Yang, we again took the easterly road while the 29th Brigade covered along the road to the west.

There was little fighting during this long retreat although the situation got sticky on several occasions and the shooting became quite brisk. The 2nd Chemical Battalion took full advantage of its opportunities as rear guard and managed to re-equip itself very well as we moved to the south. We also learned much concerning the tactics of rear guard actions.

The Eighth U.S. Army stopped just south of the 38th Parallel and the 27th British Brigade went into position north of the town of Ouijang-bu. Here we re-established Company C using equipment that we had again brought u from Pusan, plus that which we had picked up along th way. The entire Battalion was re-organized and this tim Headquarters Company was stripped down to practicall nothing. Company B had been built up to 12 mortars whi Companies A and C had eight mortars each. Company was with the Middlesex, Company B with the Australian and Company C with the Argyles. Contact with the Chines Communist Forces had been broken off and for much of th month of December, our weeks consisted of the preparatio of defensive positions and of long range patrolling.

During Christmas week, the Chinese Communist Armie again attacked in great force and it soon became eviden that the United Nations Forces could not long hold alon the 38th Parallel, nor even retain possession of Seoul, th capital of South Korea. The order for withdrawal wa given and again the reatreat was to be covered by the tw British Brigades. As the 29th Brigade had held the bridge head at Pyong-Yang, it was the 27th Brigade's turn to hol the bridges across the Han River at Seoul, so we buttone up for the next big job.

Getting back to Seoul proved to be a sizable job in itself The 27th Brigade was to block the road into Ouijang-bu an thence into the capital city to permit the movement of al United Nations forces into the city and across the river The Reds came down rather fast and it was touch and g for most of the night. The three battalions of the 27th Brig ade leap-frogged very nicely. The Australians with ou Company B were cut off but they chopped their way out i short order and the entire Brigade closed into the city jus before a cold dawn, having set the Chinese well back o their hocks and with very light casualties to our side.

We were very confident of our ability to hold the bridge head in Seoul. For two weeks, while we were north of Ou jang-bu we had thoroughly reconnoitered and prepared de fensive positions. Fires were carefully planned and the data computed. We even ran in our telephone lines. But in the evening of the day that the Brigade reached Seoul the en tire order was changed and we were given a new sector an different bridge to guard. The order came in too late fo reconnaisance in daylight.

We took up positions in the dead city on pitch black night with orders to hold until the last United Nations soldier had crossed the Han River to the south shore. The Brigade had a battalion of 105 howitzers and these were emplaced on the south bank. The Chinese Communists drove hard i an effort to catch the United Nations Forces north of the river but the 27th British Brigade held fast and inflicted such terrific casualties on the Reds that their attack lost momentum.

A magnificent job was done here by the 27th U.S. In fantry Regimental Combat Team which was the last unit to cross the Han River before our Brigade. The command ing officer of the 27th U.S. Infantry RCT visited the 27th British Brigade Command Post during the night and gave us a time table showing when each element of his command would reach the bridge approach. Before dawn, the 27th U.S. Infantry Regimental Combat Team broke contact in the middle of a vicious fire fight and entrucked. The colonel's march table was executed exactly as planned. Our radio operator at the bridge approach ticked off each element of the Regiment as it arrived and all check point times were right on the button. This most difficult operation, so skillfully planned and brilliantly executed, was reassuring to the 27th British Brigade. We gradually pulled in and reduced the bridgehead and about 1030 in the morning started to "milk out" the battalions, then the companies of the last battalion until all were safely across the river. The Brigadier, with a small command group, remained in Seoul until the last of his troops were on trucks and rolling across the bridge. When all had cleared, the bridge was blown.

The Eighth U.S. Army took up new defensive positions some distance south of Seoul. The 27th British Brigade, with the 2nd Chemical Mortar Battalion still attached, occupied a sector in the center of the front, south of Ichon. Here, though the weather was bitter cold, the fortunes of the Battalion began to improve. We received the first replacements since our arrival in Korea, one hundred and fifty men. They were nearly all enlisted reservists and former artillerymen. They arrived late in January and were as fine a group of men as any commander could desire. We welcomed them with open arms. They increased the strength of the Battalion by nearly fifty per cent. We secured more equipment and soon had all three companies organized with three platoons of four mortars each. The 2nd Chemical Mortar Battalion was in full scale business again.

All other United States Army Combat units received large numbers of replacements. The rations improved and most important of all, General Ridgway gave new confidence to his fighting men. He told us in effect that he was not in the real estate business; that regained territory meant much less to him than dead Chinamen. He named his next offensive "OPERATION KILLER" and that meant just what it said.

Early in February our attack was launched. It got off to a good start and it progressed just the way that General Ridgway said it would go. Advances in miles or yards were small but the box score on dead was very high indeed. The infantry did not barrel along the roads in trucks, but instead they combed out the hills on foot. Some days, we made only a few thousand yards but the yardage thus gained was all ours. And in the matter of reserves, General Ridgway was very tough. All units of all echelons would always have a strong reserve and there were no exceptions made.

The combat man appreciated this kind of leadership and this type of operation. It meant that he got a decent break; that all of the advantages were not held by his enemy. The men of the 2nd Chemical Mortar Battalion jumped off on "Operation Killer" all bright-eyed, bushy-tailed and full of fight.

The story of the 2nd Chemical Mortar Battalion will not be complete until the war is won and the Battalion is home again. But no matter how glorious their future triumphs may be, no group of men can ever give more loyal devotion to their commander than that which I received from the men of the 2nd Chemical Mortar Battalion.

HISTORY OF ARMY CHEMICAL CENTER

By Major Mary B. Warner*

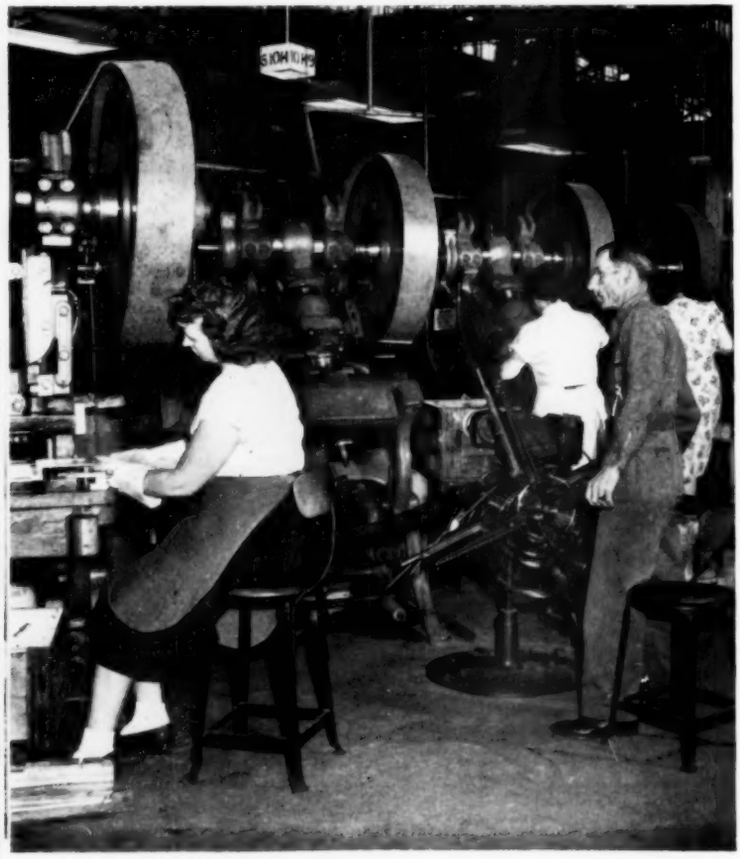
Located on the Gunpowder Peninsula, twenty miles north of Baltimore, the Army Chemical Center has evolved from a long series of changes, expansions, and the subsequent necessity of an agency to control the various organizations which came into being as part of the Chemical Warfare Service.

Originally the installation was known as Edgewood Arsenal, which had been developed in order to carry out the filling of shells with toxic materials during World War I. It was first intended to locate it on Kent Island, Maryland, but Congress failed to approve this plan. Later a large tract of land near Aberdeen, Md., was taken over by the government and set aside as a proving grounds, a portion of which was to be used for the proposed chemical plants.

The area chosen was a peninsula, eight miles long and averaging two miles in width. The ground was well adapted for the purpose. It was an isolated district and yet relatively near the embarkation ports. Moreover, railroad transportation could be easily secured since the main line of the Pennsylvania Railroad between Baltimore and Philadelphia bordered on the tract; water transportation was also available as the Bush River was close at hand.

POST HEADQUARTERS

PUNCH AND PRESS SHOP OF PRODUCTION DIVISION



With the intention of only having a place for filling shells with toxic materials, such a plant was constructed in 1917. The materials for filling were to be purchased from existing firms. Difficulties arose, however, which made it imperative that the War Department manufacture much of its own toxic materials. Accordingly, a chloropicrin plant and a phosgene plant were erected during the winter of 1917-18.

On May 11, 1918, ground was broken for the chlorine plant which was completed and put into production by September of 1918. A mustard gas plant was also erected and in production by June of the same year. At the conclusion of World War I, existing plants were modified, and used to the greatest possible extent under peacetime conditions.

The Arsenal then became a center of research and development and great advancements were made, both of a military and scientific nature.

Upon our entry into World War II, existing plants were rehabilitated, new buildings constructed, utilities were expanded, and once again Edgewood Arsenal took its place in the war effort.

By early 1942 expansion was so great that it was no

*Public Information Officer, Army Chemical Center, Md.

longer possible for the Commanding General to exercise direct control over all the Arsenal's functions along with the troop training which was going on. Decentralization had to be effected and this was done in accordance with instructions from the Secretary of War in Spring of 1942.

Decentralization was carried out along functional lines—activities were grouped under the headings of manufacturing, research and development, and training. Storage activities were becoming more and more extensive and it soon became necessary to set up an agency to supervise the Chemical Warfare Depot, now known as the Eastern Chemical Depot. All of these activities were carried on under the jurisdiction of the newly created Chemical Warfare Center.

After the redesignation of the Chemical Warfare Service to the Chemical Corps in August, 1946, the Chemical Warfare center was redesignated the Army Chemical Center in June of 1947. Under the ensuing reorganization, all former separate installations which existed at the Center were discontinued and reorganized as activities of Army Chemical Center.

BRIG. GEN. CHARLES E. LOUCKS
Commanding General

DECONTAMINATION OF AIRPLANE

DECONTAMINATION PROBLEM

Today, Army Chemical Center is commanded by Brigadier General Charles E. Loucks and the major activities include: training, research and development, manufacturing, inspection and proof testing, storage, warehousing, and shipment. In one sense, practically everything which happens in the Chemical Corps takes place at Army Chemical Center.

HEADQUARTERS

As on any Army Post, the main headquarters of Army Chemical Center is the nerve center of the activities. Almost everything which goes on is approved there, or passes through there. In that building are housed the functions of the Commanding General, the executive officer, military personnel division, post inspector, and various allied functions. A post office branch is located there along with such other activities as the public information office and the housing and billeting office.

CARL

The center of the chemical research activities is the Chemical and Radiological Laboratories, until recently known as Technical Command and now abbreviated to CARL. Its functions include research on toxic chemical agents, incendiaries, screening and signalling smokes, flame throwers, chemical mortars, and smoke generators; the development of equipment and clothing for protection against enemy use of chemical warfare agents; and the development of insecticides, rodenticides, and fungicides.

CARL is housed in a $1,500,000 building and staffed by professional and sub-professional employees, 10 per cent of whom hold Ph.D. degrees. It is well equipped to carry on the major part of its research program.

Nearby are shops, special laboratories, pilot plants, and other structures necessary for the efficient functioning of CARL. The latest scientific and engineering equipment is available for use by the research and development staff. Ranges for conducting small scale field tests of chemical agents and munitions are located a relatively short distance from the technical areas.

CARL comprises the following eight divisions: Administrative, Chemical, Engineering, Information, Munitions, Plants, Protective, and Test. In carrying out the research policies of the Chief of the Chemical Corps it functions through close collaboration of division chiefs with appropriate branches of Research and Engineering Division. The eight divisions of CARL are broken down into twenty-eight functional branches and the whole is integrated to carry through the development of a desired item from its conception through the development and test stages, to completion, when the time is ready for production.

CARL also negotiates and supervises the numerous contracts with universities, industrial laboratories, and gov-

ernmental agencies which are staffed and equipped to conduct certain types of fundamental research.

MEDICAL LABORATORIES

Located near CARL are the Chemical Corps Medical Laboratories, formerly known as Medical Division. The Medical Laboratories, in the year prior to World War II, consisted of a small group of workers in a few buildings in the Plants Area, lacking much in the way of numbers, space, and facilities. At the time of Pearl Harbor, the medical group was comprised of two officers and 35 civilians.

Expansion for the necessary war work brought laboratory buildings which provided working space during the peak year for 108 officers, 145 civilians, and 400 enlisted men. The facilities include the latest types of gas test chambers, air conditioned test rooms, a refrigerated room, 149 separate laboratories, precision scientific instruments of all types, and animal quarters which have been said to rank among the best in the country.

The Medical Laboratories at present consist of an Administrative Branch and three research branches—Clinical Research, Toxicology and Bio-Analytical Branches. Each branch is subdivided into various sections which carry out the projects assigned to them.

In many instances the work carried out at the Laboratories has found an application not only to other arms and services, but also to the peacetime world.

For example, BAL, a compound developed by the British as a protection against the poisonous Lewisite gas, has been successfully used in the treatment of industrial poisonings due to arsenic, chromium, and other metals. A nitrogen mustard, HN2, which has been developed as a blister gas, has been tried out in the treatment of cancer cases, and while it does not cure cancer, it has prolonged life in many of the cases.

CHEMICAL CORPS SCHOOL

Another installation at Army Chemical Center which is of outstanding importance is the Chemical Corps School. It has been recently announced that the school will be moved to Fort McClellan, Alabama, by the end of 1951.

The school began at the Lakehurst Proving Grounds in 1920, but was moved to Edgewood Arsenal several months later when the Chemical Warfare Service became a regular branch of the Army.

The school's beginnings at the Arsenal were small: one 12-week "line and staff" course which started in a little barracks on January 10, 1921, under the direction of Major E. J. Arkisson, first of the school's 11 commandants.

At the present time the Chemical Corps School, with a force of 84 officers and warrant officers, 240 enlisted men, and 142 civilians, conducts courses of from two to forty weeks duration in all phases of Chemical Corps activities, including radiological defense. The courses are attended by officers and men of all three branches of service, as well as special groups of foreign militarists.

But schooling is only part of its job. It also maintains a library, a printing plant, and an always-busy writing, illustration and extension course branch. Its writers prepare for the Department of the Army all field and technical manuals, extension courses and texts, and other publications which are the responsibility of the Chief Chemical Officer.

Its extension branch administers correspondence courses for all armed forces personnel in all subjects pertaining to chemical and allied warfare.

TROOPS

At the present time, along with the various organizations under its command or attached to it for necessary support, Army Chemical Center has an extensive troop training program in operation. There are several decontamination companies, technical laboratory units, and a smoke generating company. Recently the Chemical Replacement Training Center was moved from the Army Chemical Center to Fort McClellan.

During their training cycle, the men go on bivouacs and field problems. Recently maneuvers were held at A. P. Hill, Virginia, in which most of the units took part.

Besides the training outfits, there are also several technical service units on the post which provide personnel for the necessary post operational duties. The 9710 TSU Detachment No. 1, the largest and oldest unit on the post, has never been deactivated since it was set up during World War I. At present, there are about 450 men assigned to it. A recent influx of personnel has brought quite a number of college trained men into its ranks who have proven in research work their value with CARL and the Medical Laboratories.

The 5th WAC Detachment, along with Detachment No. 1, provides personnel for various duties on the post. The WAC Detachment was activated on May 27, 1943, and since then has become an integral part of post operations. At present it has a strength of approximately 80 enlisted women commanded by two officers, a captain and a first lieutenant. Most of the personnel are working as technicians, secretaries, or as part of the staffs of various offices on the post.

STORAGE DIVISION OF EASTERN CHEMICAL DEPOT

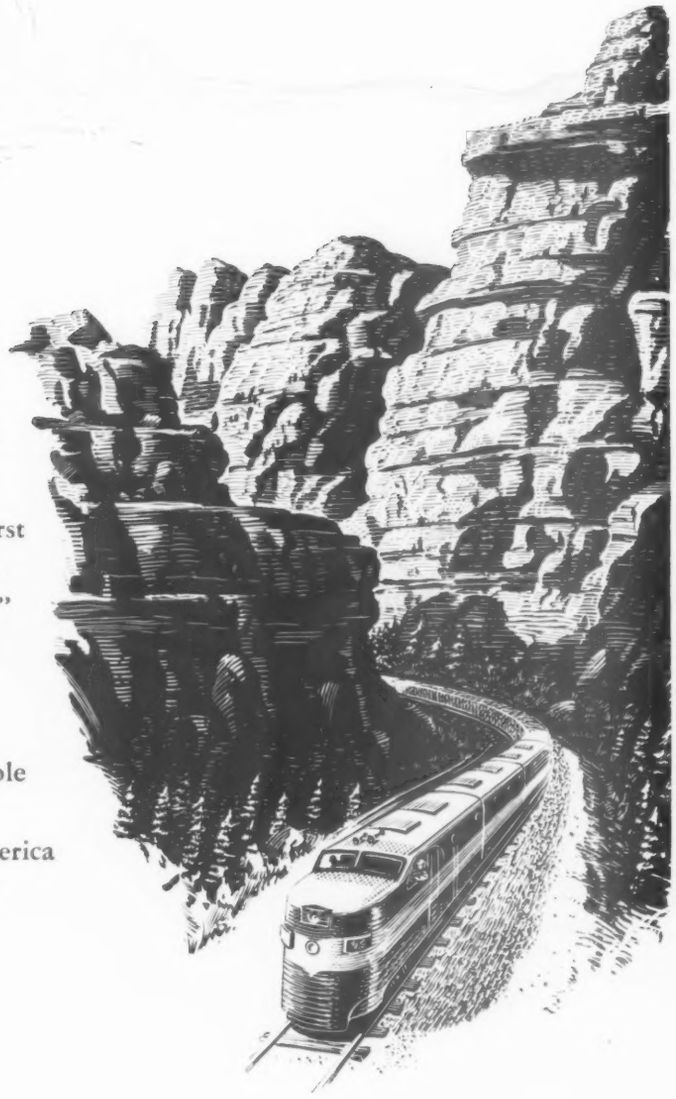
The Army Chemical Center has sent a large number of personnel overseas in the past year, including many in units such as smoke generating, decontamination, mortar, maintenance, and service companies. The remainder of the men went as replacements for various units which were already in operation but short of personnel.

Other installations of the post include two chapels, service clubs, barracks for the enlisted personnel, offices, a post gym, theater, a Post Engineer, Quartermaster, and a dispensary for both military and civilian personnel. There is a post exchange, library, post office, and the many other establishments to be found on an Army post such as the Special Services Branch, Information and Education Section, and other units set up for recreational facilities. A bus system is also operated around the post.

AIR FORCE

Army Chemical Center also boasts an Air Force Detachment, the 3210th Chemical Test Squadron. The 3210th works in cooperation with the various research and develop-

Our PARTNER has been PROGRESS...since 1866



Wouldn't our pioneer forefathers be awed by the miracles of modern-day construction? Many of the products of Olin Industries have played a large part in America's progress for almost a century . . . first with the manufacture of the famed Winchester Rifles which are known as "the guns that won the West," and today with a myriad of products so essential to progress.

The miracle of railroading entailed such things as blasting rock and moving mountains. The dependable high explosives, that Olin Industries has long produced, are another example of the superiority America recognized in all of Olin Industries' many products.

OLIN

OLIN INDUSTRIES, INC.

East Alton, Illinois

Products of Divisions, Subsidiaries, Affiliates:

WINCHESTER: Firearms, Ammunition, Flashlights, Dry Cell Batteries, Roller Skates. WESTERN: Brass, Bronze, Phospher Bronze, Nickel Silver, Copper, Ammunition, Traps and Targets, Blasting Caps. BOND: Flashlights, Dry Cell Batteries. EQUITABLE, COLUMBIA, LIBERTY, EGYPTIAN, TEXAS, WESTERN: Railway Fusees and Torpedoes, Black Powder, Dynamite, Blasting Powder. THE ECUSTA PAPER CORPORATION: Cellophane, Cigarette Paper, Fine Papers. THE HARWID COMPANY: Polyethylene.

ment and testing agencies on the post, furnishing personnel and equipment necessary for any test projects. Along with bombing and surveillance work in aiding in the testing of new items of Air Force chemical equipment, the 3210th also participates in various demonstrations put on by the Chemical Corps School.

The 3210th is attached to the Air Proving Ground at Eglin Field, Florida, and is under the Armament Test Division of the Command.

COMMANDING GENERAL

*General Loucks was born in Mayfield (now Palo Alto), California, June 29, 1895. He was educated in the local schools and attended Leland Stanford University, from which he graduated with the degree of Bachelor of Arts.

He was appointed a second lieutenant in the Coast Artillery Section of the Officers Reserve Corps at the Presidio of San Francisco in May, 1917, and was placed on active duty as a second lieutenant, Coast Artillery Reserve Corps, on June 14, 1917. He was commissioned a second lieutenant (provisional), Regular Army, October 25, 1917, and was promoted to first lieutenant (temporary) the same date, and to captain (temporary) on May 16, 1919, and captain,

CHEMICAL CORPS MEDICAL LABORATORIES

Regular Army, July 1, 1920.

He served at the coast defense forts of San Francisco and the Presidio until the summer of 1918 when he was assigned to and commanded Battery E of the 40th Coast Artillery (railway). The regiment never left the United States and after demobilization in December 1918, he was transferred to the Philippine Islands, where he served at Corregidor and other posts in the coast defenses of Manila and Subic bays. Incident to this tour of duty, he visited Vladivostok, Siberia, South Manchuria, China, and Japan.

Returning to the United States in 1921, he served at Fort Winfield Scott, California, and later was transferred to Fort Crockett, Galveston, Texas. At both of these stations, he served with Anti-Aircraft Artillery. In 1923 he was transferred to Fort Eustis, Va., where he served as regimental adjutant of the 51st Coast Artillery until his detail to the Chemical Warfare Service and transfer to Edgewood Arsenal in 1925.

In 1926, he attended the Chemical Warfare School and graduated from the Line and Staff course, following which he served at Edgewood Arsenal on various duties and later with the Research and Development Divisions. In 1929, he was detailed to the Massachusetts Institute of Technology to take a course in Chemical Engineering Practice and in 1931 he was awarded the degree of Master of Science. He returned to Edgewood Arsenal and for eight years served as Assistant Technical Director and then Technical Director. He was promoted to Major in 1935. He attended and graduated from the field officers course of the Chemical Warfare School in 1938, and in 1939 he was sent to the Army Industrial College, graduating in June 1940.

He was transferred to the American Embassy, Paris, France, as Assistant Military Attache, arriving there on June 9 and, due to the capitulation of France and the German occupation, departed from Hendaye, France, on July 4 for London, via Spain, and Lisbon, Portugal.

He arrived in London on July 11, 1940, and served there as Assistant Military Attache during the Battle of Britain. While on this tour he was promoted to Lieutenant Colonel. He returned to the United States in March, 1941. He was then assigned to duty in the Office of the Chief of the Chemical Warfare Service, and in the following July was appointed Executive Officer. He was promoted to Colonel on December 24, 1941, and held the temporary rank of Brigadier General from December 3, 1942, until June 30, 1946.

From August 1942 until April 1944, General Loucks was Commanding General, Rocky Mountain Arsenal, Denver, Colorado, and, in recognition of his work there was awarded the Legion of Merit.

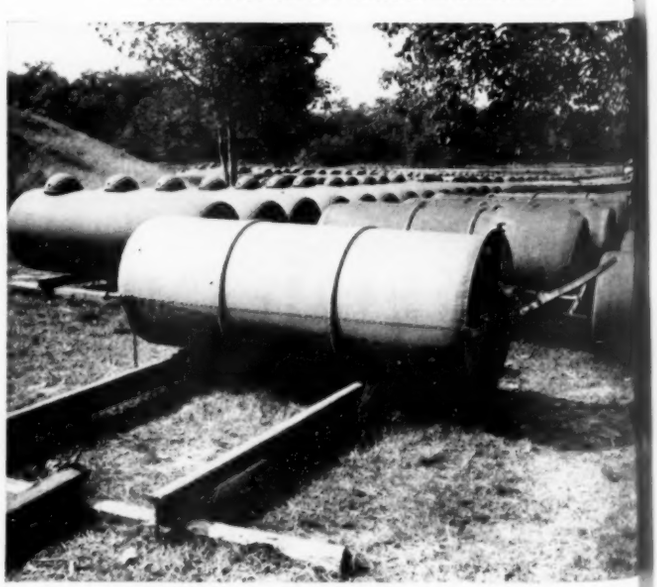
In May 1944, General Loucks was named Chief of the Industrial Division in the Office of the Chief of the Chemical Warfare Service, Washington, D.C., serving in that capacity until August 1945. He was awarded the Distinguished Service Medal for his record as Chief of that Division.

He was appointed Chief Chemical Officer of Army Service Command-C, Asiatic-Pacific Theatre, in August of 1945. He left Tokyo for Washington in December of that year to become Assistant Chief of the Chemical Warfare Service for Research and Development (later redesignated as Chief, Research and Engineering Division). His office was moved from Washington to the Army Chemical Center in September 1946. General Loucks was awarded the Army Commendation Ribbon during this tour of duty.

In March 1948 he received assignment to the European

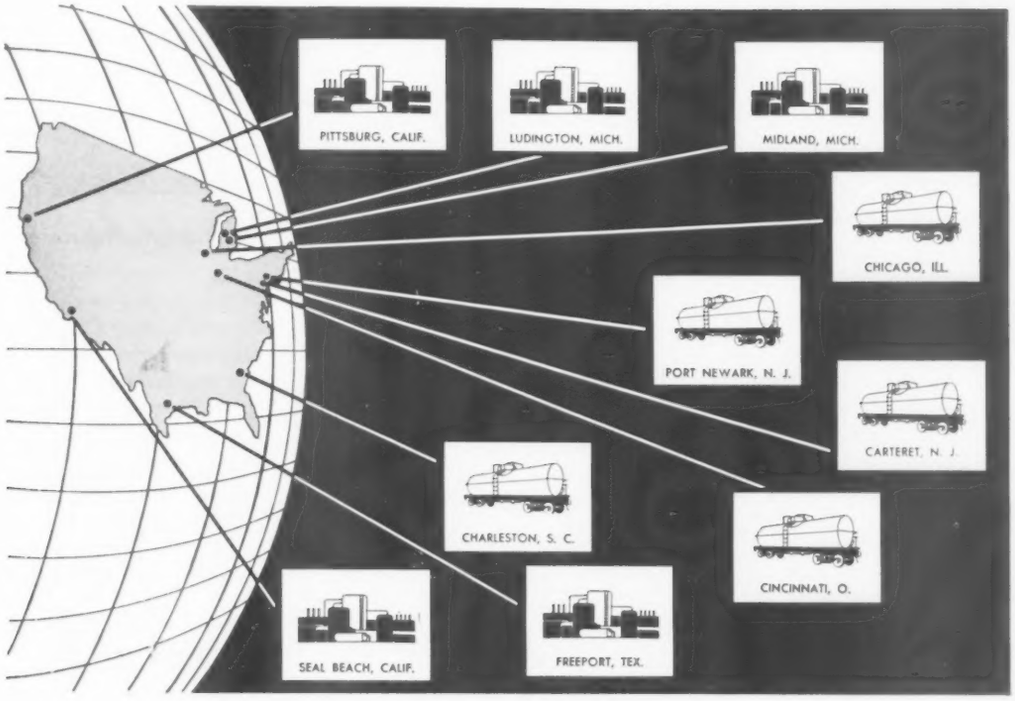
(Continued on Page 30)

TOXIC GAS STORAGE OF EASTERN CHEMICAL DEPOT



*As the JOURNAL goes to press, General Loucks is Acting Deputy Chief Chemical Officer.

to serve you better...



Distribution

The Dow Chemical Company, producer of more than 600 basic industrial, pharmaceutical and agricultural chemicals, has established a world-wide reputation for reliability and service. Since its beginning over fifty years ago—as production facilities expanded and plants sprung up across the country—Dow's sole objective has been to produce top quality chemicals.

And, because the ability to deliver these chemicals to any point in the nation is extremely important, Dow has built an unparalleled network of distribution. The plants and distribution centers shown above are all within easy distance of the large rail centers of the country. Dow supplements these facilities with its own fleet of barges and tank cars, and is able to ship chemicals to any destination—promptly and speedily.

Dow's main plant at Midland, Michigan is one of the largest in the country. It includes more than 400 buildings on a site covering 900 acres. Within the plant, Dow operates its own 28-mile railroad, and has its own docks on the nearby Great Lakes. Other Dow plants are at Ludington, Michigan; Freeport, Texas; Seal Beach and Pittsburg, California—all strategically situated to better serve the needs of industry. If you desire information about any chemical, write Dow at Midland or contact the nearest sales office. Technical information and assistance are available upon request.

THE DOW CHEMICAL COMPANY
MIDLAND, MICHIGAN

DOW
CHEMICALS
INDISPENSABLE TO INDUSTRY AND AGRICULTURE

SPEAKING OF "CLASSIFIED MATTER"

OFFICE OF PUBLIC INFORMATION
DEPARTMENT OF DEFENSE

By The

FACILITIES CLEARANCE BRANCH

New York Chemical Procurement District

Chemical Corps, U.S. Army

When referring to National Defense, we hear much in these times of matter which has been "classified" by the government. Just what is "matter" and what is "classified matter"?

The Office of Manpower and Industrial Security, Munitions Board, Department of Defense, says: "Matter is any document, product or substance on, or in which, information may be recorded or embodied. Matter shall include everything regardless of its physical character or make-up. Information which is transmitted orally shall be considered as matter for purposes of security. Machinery, documents, apparatus, devices, photographs, recordings, reproductions, notes, sketches, maps and letters, as well as all other products, substances or materiel shall fall within the general term of matter." "Classified matter" is information or material in any form or of any nature which, in the interest of national security, must be safeguarded in the manner and to the extent required by its importance."

Then follows the breakdown. "Top secret" matter is "all information and material, the security aspect of which is paramount and the unauthorized disclosure of which would cause exceptionally grave damage to the nation." Just plain "secret" matter is "all information and material, the unauthorized disclosure of which would endanger national security, or cause serious injury to the interests or prestige of the nation."

"Confidential" matter is "all information and material whose unauthorized disclosure would be prejudicial to the national security or prestige of the nation."

Other matter which requires security protection, but is not important enough to be "Top Secret," "Secret" or "Confidential' is called restricted.

The term "Security," as used above, refers to the safeguarding of this classified matter against unlawful dissemination, duplication or observation because of its importance to national defense.

A contractor who is planning for M-Day procurement of classified items, or one now involved in procurement of these items, is responsible for the safeguarding of all classified matter under his control and is forbidden to supply or disclose its contents to any unauthorized person.

"The safeguarding of classified information," says the Munitions Board, "shall be provided for by suitable defensive measures within the contractor's plant, dictated by the accessibility of classified information." When it is impractical to prevent unauthorized individuals from having access to classified matter by other means, it is necessary to protect this matter by control of the area in which it is located.

Such contractor is required to submit at once to the contracting officer of the government installation concerned, a complete confidential report of any information he may have of existing or threatened espionage, sabotage, or subversive activity, at any plants, factories or sites at which work for any military department is being performed or at which material is acquired, fabricated, manufactured, or stored in connection with the performance of any contract. Further, the contractor is required to submit to the government a report of any compromise of classified matter. "Compromise" involves the loss of security due to an unauthorized person having obtained knowledge of classified matter.

The contractor is obliged to bring to the attention of all persons engaged in the preparation of bids, quotations, or in the performance of work on contracts which involve access to classified matter, their individual responsibilities for safeguarding classified matter and, particularly, that the unauthorized disclosure of classified matter is punishable under the provisions of several federal statutes.

The security classification of information is determined by the government. When the contractor learns of the classification he is to safeguard the information by clearly indicating on all subsequent matter related thereto the applicable classification. Receipt of all such material is to be recorded at the contractor's plant, along with a record of the number of copies reproduced at his direction. A system is required to be established listing the transfer of matter, top secret and secret, so that the chain of transmittal can be ascertained.

Documents containing classified information furnished to persons other than those of or in the employ of agencies of the Department of Defense shall bear this notation: "This document contains information affecting the national defense of the United States within the meaning of the Espionage laws, Title 18, USC., Section 793 and 794. Its transmission or the revelation of its contents in any manner to an unauthorized person is prohibited by law."

A list of all persons within a plant who have access to top secret documents or to whom top secret information is disclosed shall be maintained. The number of these persons is to be kept at a minimum. They are to be warned individually against disclosing these matters to anyone whose duties do not require such disclosure. The transmittal and custody of top secret matter is to be covered by a receipt system in and outside the plant. Under no circumstances is top secret matter to be transmitted through mail channels. The contractor is not to make or permit the making of any photograph or other reproduction of matter classified as top secret except upon written authorization. While not in use, top secret matter is to be stored in steel safes or vaults having combination of not less than three tumblers and capable of minimizing the possibility of theft, tampering and damage by fire. No person is permitted access to top secret or secret matter unless cleared by the government.

Persons requiring clearance shall be selected by the contractor's determination of each individual's need for such information in the performance of his assigned duties. Any employee who has been denied clearance by the government or whose clearance has been revoked by the government shall have the right of appeal to the Industrial Employment Review Board of the Munitions Board.

In the case of precontract negotiations and advertisements, only those officers, directors, owners and key employees of the contractor, who have been cleared by the government shall have access to classified material—unless the contractor is notified by the government that such clearances are not required. (A "key employee" is one who requires access to classified matter for the purpose of preparing a bid or quotation.)

In the event a contract is awarded, only the following have access to classified matter: (1) United States citizens and alien employees of the contractor who require such access in connection with the performance of work on the contract and who have been cleared by the government. (2) United States citizens and alien employees of the contractor who require access to matter classified confidential or restricted in connection with the performance of work on the contract, and who have been cleared by the contractor. A clearance by the contractor shall be based on a determination that the individual's employment records are in order as to United States citizenship and absence of derogatory information indicating that the interests of such individual are inimical to the security interests of the United States. Whenever there is any evidence that the continued employment of such persons constitutes a security risk, a report shall be submitted to the contracting officer or his duly authorized representative. (4) Other persons specifically authorized in writing by the government.

Applications for clearance are to be made by the contractor for its officers, directors, owners, employees, consultants, and other individuals not in his regular employment, for whom government clearance is required as before specified and shall be made to the contracting officer.

All facilities handling classified work have or will receive the "Indus-

(Continued on Page 30)

WINNERS OF AFCA AWARDS TO OUTSTANDING ROTC STUDENTS

1950 - 1951

BYRON D. BABCOCK
ROTC
University of Delaware
Newark, Del.

FRANK HALL CHEANEY, JR.
ROTC
Texas A&M
College Station, Texas

WALTER HARMON
ROTC
Mass. Inst. Tech.
Cambridge, Mass.

DOUGLAS W. FEAT
ROTC
Ohio State University
Columbus, Ohio

JACK BALDWIN POWERS
ROTC
Georgia Inst. of Technology
Atlanta, Georgia

ROBERT D. WESSELHOFT
ROTC
Purdue University
Lafayette, Ind.

CADET PAUL R. BOBO, JR.
AFROTC
The Citadel
Charleston, S. C.

WILLIAM C. DAVY
AFROTC
Michigan State College
East Lansing, Mich.

WILLIAM J. JAMESON
AFROTC
Montana State Univ.
Missoula, Mont.

CHARLES J. SHOAF
AFROTC
Virginia Military Institute
Lexington, Va.

JAMES CLINTON CASE
NROTC
University of Wisconsin
Madison, Wis.

BURTON GRANT CHRISTENSEN
NROTC
Iowa State College
Ames, Iowa

HOWARD WYATT GARDNER
NROTC
Purdue University
Lafayette, Ind.

ALFRED A. HOFFMAN
NROTC
The Rice Institute
Houston, Texas

ARCHIBALD JAMES McNEILL, JR.
NROTC
Georgia Institute of Technology
Atlanta, Georgia

SAMUEL A. WILSON
ROTC
The University of Oklahoma
Norman, Okla.

G. W. Dorn of the Dallas present the Armed Forces Chemical Association award to Midshipman Alfred A. Hoffman, The Rice Institute, NROTC, Houston, Texas.

AFROTC Cadet William J. Jameson, Montana State University, Missouli, Mont., receiving Armed Forces Chemical Assn. Award from Dr. Richard H. Jesse, Vice President and Chairman, Dept. of Chemistry.

these **WITCO** *facilities*

–at your service for DEFENSE PRODUCTION

Eight plants, pilot plant, research and technical service laboratories

Witco Chemical Company has been manufacturing chemicals for defense, when required, over a period of twelve years, and is ready and willing to assume additional defense production at the expense of civilian requirements. Defense has priority with Witco and our eight plants, pilot plant facilities, research and technical service departments are at the disposal of the government to develop and produce chemicals needed for the defense effort.

All inquiries will receive prompt attention whether in connection with those listed or for other defense products.

A few of Witco's products meeting government specifications...

Napalm (JAN-N-589)
Aluminum Stearate (MIL-A-15206-Ships)
Barium Stearate (JAN-B-366)
Calcium Stearate (JAN-C-263)
Magnesium Stearate (JAN-M-542-Ammunition) (JAN-M-560—Ointment)
Lead Stearate (for ammunition) (JAN-L-758)
Copper Naphthenate (CS-152-48) (Army 100-17) (AXS-1244)
Drier, Paint, Liquid (TT-D-651a) Type I and Type II
Drier, Naphthenate, Concentrated, Liquid (Navy 52-D-7) (AN-TT-D-643) Type I, Lead 24%; Type II Cobalt 6%; Type III Manganese 6%; Type IV Zinc 8%
Linoleate, Manganese (MIL-L-15188-Ships)
Resinate, Manganese (Navy 52-R-8a)
Zinc Naphthenate (for use in Army Spec. AXS-1296)
Wood Preservative, Copper Naphthenate (52 W 5 Type A)
Carbon Black, Dry (for explosives) (JAN-C-306)
Case Liner Adhesive (JAN-P-140, Type I)
Paint, Acid Proof, Black (for ammunition) (JAN-P-450)
Composition, Top Coating Material Bituminous (JAN-P-102)
Compound, Chassis Coating (Army AXS-1827)
Compound, Protective Strippable (Army AXS-1756)
Compound. Rust Preventive Thin film (Army AXS-673)
Compound, Sealing, Dipcoating (JAN-P-115)

Also Asphalt and Asphalt Compounds meeting Military and Federal Specifications

WITCO CHEMICAL COMPANY
DEFENSE PRODUCTS DIVISION
75 East Wacker Drive
Chicago 1, Ill.

"CLASSIFIED MATTER"

(Continued from Page 27)

trial Security Manual for Safeguarding Classified Matter," issued by the Department of Defense, Munitions Board. This manual goes into thorough detail on this subject.

Facilities with whom plans are now being made for M-Day procurement of classified items, and facilities with whom there is current classified procurement, are being investigated and granted clearance, where fitting, so they may handle or will be ready to handle classified military information for all services.

By direction of the Munitions Board, a consolidated file has been established at the office of the Provost Marshal General, showing all clearances granted by the Army, Navy and Air Force. It is mandatory that any agency desiring to use a facility must first check with this central file to ascertain the status of clearances already granted. This central file is providing a considerable saving of time and effort to the services as well as to industrial facilities in this regard.

The N.Y. Chemical Procurement District at 111 East 16th Street, New York City, has established the Facilities Clearance Branch within its headquarters, This branch is headed by an officer who instructs and assists industry, in addition to making visual plant security surveys. The branch functions jointly with the planning and procurement divisions of the district.

ARMY CHEMICAL CENTER

(Continued from Page 24)

Command as Chief Chemical Officer, EUCOM, and, in October 1950 again became Brigadier General. He was assigned as Commanding General, Army Chemical Center, and assumed command on February 19, 1951.

EDGEWOOD ARSENAL

Edgewood Arsenal, which is now referred to as the Plants Area of Army Chemical Center, is at the present time only partially in operation with many of the plants in a standby status.

The Production Division of Edgewood Arsenal has approximately 90 buildings under its jurisdiction, all of

which are not manufacturing plants however. There are power generating units, warehouses, and other various facilities which are needed for production.

The Edgewood Arsenal earned the Army-Navy "E" award four times for its outstanding performance—November 1942; August of 1943; March of 1944; and in March 1945.

CHEMICAL CORPS BOARD

In November of 1926, the Chemical Warfare Board, now known as the Chemical Corps Board, was established at Edgewood Arsenal.

At that time the Board consisted of five members—the President; Recorder; Commandant of the Chemical Warfare School; Commanding Officer of the First Gas Regiment; and the Technical Director.

The duties of the Board were very general and were concerned mainly with advising the Chief of the Chemical Warfare Service in regards to varied activities, manuals, training and technical regulations; examination of reports of tests made by using services, and other agencies; and investigation and recommendation concerning CWS problems which required the initiation of new projects.

At the beginning of World War II, the Chemical Warfare Board was greatly expanded in order to fulfill the primary mission of field testing and evaluating all Chemical Warfare material developed by the outside agencies.

From the beginning to the end of the Second War, the Board completed approximately 442 projects. A total of 823 projects have been considred by the Board since its inception in 1926.

Following V-J Day, the Chemical Warfare Board was reorganized as a staff agency of the Chemical Corps and was renamed the Chemical Corps Board.

As a staff agency, the Board is responsible for advising the Chief Chemical Officer on matters of broad policy with reference to research and developmental organization and training; military doctrine; evaluation of material; and supply and procurement.

The Board also conducts special studies on a wide range of subjects as directed by the Chief Chemical Officer. From time to time Board personnel are assigned on a temporary duty basis at field exercises, maneuvers, and field tests.

The Board at the present time is composed of six permanently assigned military members, each selected for his specialized knowledge; and three appointed members, who are selected by the Chief Chemical Officer to act in an advisory capacity to the Board.

In addition to these members, the Chemical Corps Board employs a number of civilian specialists in each of the following Divisions: Agents; Protection; Munitions and Weapons. The other two divisions, the Organization and Training Division, and the Environmental Factors Division are composed of all commissioned personnel.

The Environmental Factors Division was organized recently in order to insure that present standardized Chemical Corps material previously tested under temperate conditions only, will function satisfactorily within the temperature ranges recently established by the Department of the Army.

Cooperating with the Chemical Corps Board are the British and Canadian Liaison Officers at Army Chemical Center, together with Liaison Officers of the United States Air Force, Army Field Forces, Department of the Navy and Marine Corps.

EDGEWOOD PROVING GROUNDS

The main testing agency at Army Chemical Center is the Edgewood Proving Grounds. Comparatively, the Edgewood Proving Grounds is a young outfit, having been activated in May of 1945, by the Chief of the Chemical Corps. Its current mission is to direct user, field, and engineering tests of weapons, munitions, agents, protective equipment, and other Chemical Corps material; initiate test programs; develop field techniques and field operating procedures; make comparative operational evaluations of materiel; conduct joint tests with development agencies such as Technical Command, Medical Division, the Signal Corps, Quartermaster Corps, etc.; evaluate test results and compile, edit, and publish reports.

The various facilities of the Edgewood Proving Grounds are housed in 13 buildings at various locations at Army Chemical Center, the headquarters of the activity is located near the post headquarters building. Personnel employed by the Proving Grounds comprise professional and nonprofessional civilians as well as officers and enlisted military personnel.

In the testing of various equipment, the Edgewood Proving Ground is required to comply with Department of the Army regulations for conducting tests. These state that tests must be run under varied environmental conditions. Frequently this requirement necessitates conducting tests at locations other than at Army Chemical Center. Thus the job of field testing equipment requires testing at any place where climate and geographic conditions can be used to the utmost advantage.

There are also test fabrication shops which do carpenter and machine work, welding, and general maintenance of equipment used in the various field tests.

The Edgewood Proving Ground operates and maintains eight small harbor craft, two landing craft, and two barges which are used by all agencies and activities at Army Chemical Center in connection with security patrols and research and development tests. When tests are being conducted the small boat patrols keep the water areas clear and prevent unauthorized craft from entering the range of fire.

It is interesting to note that Edgewood Proving Ground is a field test agency, and many items which are developed for the Chemical Corps are tested by the Proving Ground prior to their recommendation for standardization for use by the Armed Forces of the United States. Items tested by the Edgewood Proving Ground include chemical—and incendiary-filled mortar shells, flame throwers, fire starters, smoke generators; chemical- and incendiary-filled grenades, smoke pots, chemical agents, gas masks, collective protectors, decontaminating materials, protective clothing, and chemical- and incendiary-filled bombs.

EASTERN CHEMICAL DEPOT

Another installation at Army Chemical Center which is engaged in a very notable work is the Eastern Chemical Depot. The first of its kind to be established in the continental U.S., Eastern Chemical Depot was organized as the Chemical Warfare Reserve Depot in 1920 to handle the procurement, storage, and issuance of Chemical Corps supplies.

Basically, the general function of the Depot is to receive, store, and issue authorized reserves of Chemical Corps supplies and all types of ammunition and toxic agents; and to make shipments of some 400 end-items to resupply distribution depots, posts, camps, and stations.

In addition to these functions, it stores and issues Chemical Corps spare parts to the entire Army and other elements of the Armed Forces, in the U.S. and overseas. It also receives and stores captured enemy material.

Since Eastern Chemical Depot was the first one to be organized, much of the training of personnel for work in depots established later was handled by it. At present there are two other major depots of this type, the Midwest Chemical Depot, Pine Bluff, Ark., and Deseret, Utah.

After World War II and the subsequent demobilization,

the principal activities of the Depot were the receipt and storage of overseas shipments and the rewarehousing of stock to conform with peacetime regulations. The outstanding item to be handled at that time was napalm.

Under the program of demobilization, the Storage Division has the task of restoring bombs and the inspection and segregation of gas masks.

The Toxic Gas Storage Branch has the responsibility for the receipt, shipment, maintenance, and all records necessary for all toxic agents and other bulk chemicals.

The headquarters of Eastern Chemical Depot are located in building 34-A where all the necessary administrative matters are handled. The Depot is comprised of some 70 buildings which house the various shops and storage space.

The Depot is sub-divided into the following four divisions:

The Storage Division, which handles the storing and shipping of toxic agents along with the storage of general Chemical Crops supplies.

The Stock Control Division, by which any movement of stock, such as the receipt and issuance, is handled.

The Spare Parts Division, which is almost a depot in itself, stores and issues approximately 9,000 items of Chemical Corps material.

The Renovation Division, which does the general repair work on stock stored by the Depot.

The Depot, besides the numerous warehouses and storage sheds, has facilities such as a carpenter shop, a packing room, a machine shop and a tool crib.

The equipment of the Depot includes the most up-to-date in the way of mechanical saws, cranes for handling heavy materials, forklift trucks and the many other pieces of machinery so essential in the operation of a shipping and receiving center such as Eastern Chemical Depot.

DIAMOND ALKALI COMPANY

The Diamond Alkali Plant at Army Chemical Center, which comprises five separate buildings and covers more than five acres, recently announced the completion of a six-step modernization-expansion program at its electrolytic chlorine-caustic soda plant.

The rehabilitation project, according to James H. Fall, plant superintendent, is the most extensive of its kind since the plant was built by the government in 1942. It represents a capital investment of nearly $400,000 on Diamond's part. The increased capacity secured has enabled the company to boost its output of caustic soda and chlorine by approximately 30 per cent above former levels.

The plant was operated by the government till August, 1945, when it became inactive. It remained idle until the lease in the fall of 1946 and put it into full-scale operation Diamond Alkali organization took over under government in April, 1947, the lease was extended to 1967.

Originally, when Diamond first launched commercial production here, the plant was manned by 60 workers, most of whom live in Harford County. Today, in keeping with the steadily increased demands for its product the plant employs about 80 people.

In addition to the local facility, Diamond operates 12 other plants scattered throughout the U.S. They produce basic alkalies—calcium carbonates, chlorine and chlorinated products, as well as a whole host of allied and specialized derivative chemical compounds.

All along the Eastern Seaboard, Diamond Chlorine finds a diversity of users, including paper manufacturers, chemical production, water purification, sewage treatment, petroleum refining, and compounding household bleaches. Diamond caustic soda likewise has many applications in these fields as well as many others, such as the manufacture of soaps, plastics, and resins. The most notable plant improvement, perhaps, from the employee's viewpoint, is the location of chlorine-loading activities indoors. Formerly a large part of the packaging process was handled outdoors.

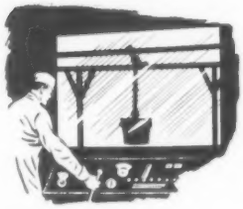
Facilties of the old "caustic fusion building" have been extensively revamped and a spur track capable of handling two cars or trucks at a time runs inside the structure. This area is used for loading chlorine in one-ton containers into multi-unit tank cars. A roofed extension of the building now enables workers also to load 100-lb. and 150-lb. containers, which had been impossible at this plant until the completion of this phase of the modernization program.

Users of Diamond Chlorine and caustic are benefitting directly from the new improvements. Thanks to the chlorine purification system, customers of the company are now securing a product of extremely high purity, thereby making available to them higher conversion efficiency of chlorination reaction in production operations. This in turn spells lower costs for the user.

A novel feature of the chlorine process is the "sniff gas" recovery system installed at the plant. A development of Diamond engineers, it enables low-grade chlorine gas to be recovered as a liquid.

Interesting to note are the implications of the normal usage requirements by Eastern industry of Diamond's products. Increased consumption of chlorine for its known applications, coupled with the defense-spurred development of new ones, is expected to keep the plant at peak capacity for some time to come.

TOO "HOT" FOR ORDINARY HANDS!



When materials are too "hot" to handle, Greer solves the problem with "mechanical hands" remotely controlled by an operator far enough away for absolute protection.

These remarkably ingenious devices rival the versatility of the human hand. Objects weighing up to 250 lbs. are moved up, down, sideways, and are pin-pointed on any working area. It is a simple matter, for instance, to pour liquids from container to container.

Many less dramatic but equally important materials-handling and similar problems have been solved – or are being solved – by Greer Research and Development engineers. With many years of work in the field, these men offer you specialized knowledge and abilities which are difficult to find elsewhere.

If you are concerned with any phase of materials handling, you are invited to bring your problems to Greer. Here you will find *creative engineering* at its best – the kind that is accustomed to meeting and solving the "impossible". An inquiry on your company letterhead will receive prompt attention.

GREER
RESEARCH & DEVELOPMENT

GREER HYDRAULICS INC. · 450 EIGHTEENTH STREET · BROOKLYN 15, NEW YORK

CHARCOAL FOR MILITARY RESPIRATORS

By Saul Hormats

Chief Engineer, Protective Division
Chemical Corps Chemical & Radiological Laboratories
Army Chemical Center, Maryland

Activated charcoal used in military respirators for adsorbing toxic gases is basically the same as the carbons used for decolorizing and deodorizing purposes and the recovery of solvents. It must, however, meet the following special requirement:

a. Be in the form of granules which are sufficiently hard to withstand the rough handling to which military equipment is subject in the field.

b. Be sufficiently condensed to include a maximum quantity of active adsorbent in a limited volume, yet not so dense because of the presence of inactive constituents as to add unduly to the weight of the masks.

c. Adsorb rapidly and non-specifically, and retain, toxic gases.

d. Undergo a minimum loss in adsorptive properties by exposure to humid air.

e. Serve as a stable carrier for such catalysts as may be added to the charcoal for destroying difficultly adsorbed or retained gases.

Charcoals to meet these requisites are made by both chemical and gas activations.

Chemical Activation

Substances which have been proposed for the chemical activation of wood and other carbonaceous materials include (2, 5):

Zinc chloride	Phosphoric acid plus sulfuric acid
Potassium thiocyanate	Calcium diphosphate
Potassium sulfide	Calcium triphosphate
Phosphoric acid	Sulfuric acid
Ferric chloride	

Some of these are in use in the manufacture of decolorizing carbons. The production of chemically activated gas adsorbent carbons is largely confined to the use of zinc chloride, potassium thiocyanate, and potassium sulphide.

Zinc Chloride Activation

Carbonaceous materials suitable for chemical activation include peat and such woods as maple, ash, oak, hickory and beech. The woods generally are obtained as waste-product chips from lumber mills, furniture factories, etc. The peat or chips are first passed through a hammer mill and reduced to 1.5 mm. or smaller particle size, then mixed with a 45% to 65% solution of zinc chloride. From 70 to 90 parts of 100% zinc chloride are used per 100 parts of wood, and from 40 to 45 parts per 100 parts of peat. The materials are mixed in dough mixers or pug mills for about two hours, or until a homogenous plastic product is obtained.

The resulting black dough is extruded with either a pug mill or hydraulic press through multiple orifice dies, forming long plastic "spaghetti" of 1.5 to 2 mm. diameter. Pressures of the order of 2000 to 3000 lbs. p.s.i are used.

Several methods are in use for processing the extruded mixture. In one process (2) preliminary activation is conducted on a continuous basis in brick lined, countercurrent flow, direct gas-fired, horizontal rotary kilns which are 60-75 ft. long by 5-6 ft. internal diameter. Retention is about 2 hours. Inlet temperature of the heating gas is 1700° F., maximum carbon temperature 1300° F., with the temperature of the evolved gas about 400° F. The evolved gases, essentially moisture, zinc chloride and hydrochloric acid, are passed to scrubbing towers for recovery of the zinc chloride and hydrochloric acid. The steel recovery towers are lined with acid-resistant brick for scrubbing the initially hot gases, and rubber lined for the cooler gases. Recovered solution from the towers is pumped into cast iron tanks for concentration. The charcoal from the preliminary activator kiln is then leached.

Leaching is conducted in acid-resistant brick lined vats, each holding about two tons. Pumps are used for recirculating washing liquors through the beds of material. The contents of each vat are first treated with hot 3% hydrochloric acid to react with and dissolve zinc oxides. The acid solution is drained and pumped to the zinc chloride recovery system. The charcoal is then washed with hot water to remove the chlorides. Removal of zinc is easily accomplished, control on the washing operation being, rather, a test for residual hydrochloric acid.

The product at this stage of the process possesses a high adsorptive capacity for gases such as carbontetrachloride and benzene when dry and at high concentration. However, it has been found that when humidified or when tested at relatively low concentrations of gas, its adsorptive properties are low, thus making the charcoal unsatisfactory for use in respirators. Calcination at elevated temperatures or a secondary activation with steam correct these deficiencies materially, presumably through a modification in the surface complexes of the carbon. Accordingly, the production of carbon for respirator purposes includes a second activation step. This second activation is conducted in a rotary kiln similar to that for the first activation, at a maximum carbon temperature of about 1000° F., using about 8 lbs. of steam per lb. of product produced. The final product is cooled and screened.

Potassium Sulphide and Thiocyanate Activation

In this German development, about 40 parts of potassium sulphide or potassium thiocyanate in the form of saturated solutions are used per 100 parts of carbonaceous material. The materials are mixed in the same manner as for zinc chloride activation, either directly extruded or else first partially dried at 225° F. and bound with tar. The extruded product is calcined in indirect-heated, brick-lined, rotary kilns. Since the mixture is readily ignited, the heating must be very carefully controlled at temperatures just below the ignition point. The product is washed and dried, using equipment similar to that with zinc chloride. No secondary activation is necessary.

Gas Activation

Gases which have been considered for the activation of charcoal include chlorine, oxygen, carbon dioxide, and steam. Of these, only the last two have been successfully applied to the manufacture of respirator charcoal. The largest production of military respirator charcoal utilizes steam for the activating agent. Raw materials which have been steam-activated to produce a satisfactory respirator charcoal include:

Bituminous coal.
Compressed wood briquets
Apricot pits.
Black walnut shells.
Coconut shells.
Coconut fines-coal mixtures.
Coal-nutshell-sawdust mixtures.
English walnut shells.
Pecan shells, etc.
Wood charcoal.

The processes for manufacturing activated charcoal from these materials are basically the same. Each involves the following steps:

a. Preliminary crushing and sizing.
b. Intermediate temperature devolatilization and carbonization.
c. High-temperature activation.
d. Final screening.

The processing details and equipment used by the manufacturers of respirator charcoal vary and depend upon patent restrictions and design preferences, as well as upon the type of carbonaceous material to be activated. European procedures are generally more complicated than is American practice. In a typical European plant (2) the raw material used is the charcoal obtained from beechwood by destructive distillation. The charcoal is first ground in a ball or hammer mill to pass a German 80 mesh sieve, then mixed with tar. Mixing is in batches, using 250 lbs. of charcoal and 100 lbs. of tar per batch. The tar is generally one of the by-products from the beechwood distillation. In addition to charcoal and tar, the following materials are added to each batch: 4 liters of 45% potassium hydroxide solution; 3 oz. of powdered cupric oxide (for respirator charcoal only); 1.5 gal. of 19° Bé cupric sulfate solution (for respirator charcoal only). Potassium hydroxide is used as an activating catalyst. Copper compounds are added as preimpregnants to increase the adsorptive quality of the charcoal for hydrocyanic acid gas.

Each batch is mixed for about 20 min., the mixer dumped, and the contents carried in small carts to extruder presses. These presses are of a specially designed "spaghetti" type, operating at 3000 p.s.i. The plates are of steel with orifice-inserts of 1.0 to 1.5 mm. diameter.

The extruded strands are carbonized in rotary kilns at 650 to 750° F. The kilns are of iron, 35 ft. long by 3 ft. diameter, lined with firebrick. They are direct heated, using a portion of the exhaust gases from the activators for this purpose, with the remainder of these exhaust gases used for preparing steam for the activators.

The carbonizing step hardens and devolatilizes the granules, after which they are blown by an air elevator into activators. Activation is conducted in horizontal rotary iron kilns 40 to 50 ft. long by about 5 ft. diameter, lined with fire-resistant brick. The kilns are direct gas fired. Steam for activating, gas and carbon granules enter the kiln at the same end, with the inlet temperature maintained at 1650° F. and the exit temperature at 900 to 1100° F. Steam consumption is 200 to 300 lbs. per hour for a production rate of about one ton of activated charcoal per 24-hour day. The charcoal from the kiln drops directly into a vertical pipe filled with water, to prevent ignition from contact with air, and is then fed to a Dorr-type multideck classifier for washing, then dried.

American procedures are generally less complicated than the foregoing. The activation of bituminous coal to respirator charcoal is accomplished by first crushing the coal to less than 200 U.S. Standard mesh, briquetting the powder either without or with a binder (1) at pressures up to 20,000 p.s.i., then crushing the briquets to granules of a mesh size slightly larger than that desired in the final product, to allow for attrition losses. The granules then are carbonized and activated. In the processing of nutshells and similar materials, the shells are merely crushed to a somewhat larger size than desired in the final product, carbonized, and activated. Compressed wood briquets are carbonized under pressure (3, 4) to achieve optimum density and hardness of the product, then crushed and activated. American practice is not to use activating catalysts, thus eliminating the costly final washing and drying steps.

Impregnation of Charcoal

Differences in manufacturing procedures between industrial and military adsorbents are mainly for the purpose of achieving the hardness, density, and particle-size requisite for the latter. Adsorptive properties are qualitatively the same for both. Toxic agents of low volatility, e.g., mustard gas, lewisite, nitrogen mustards, are well adsorbed and restrained; highly volatile agents, e.g., phosgene, hydrogen cyanide, arsine, cyanogen chloride, are not. For these latter it is necessary to provide some other means than physical adsorption for their removal from inspired air. Soda-lime coated with sodium permanganate reacts readily with many of the more volatile agents. Formerly, mixtures of granules of this reactant and granules of activated charcoal were used in military canisters. Present practice in the armies of most countries is to use activated charcoal which has been impregnated with various reactants and catalysts. A list of impregnants which have been used and their functions are given in Table I.

Table I

Charcoal Impregnants

Impregnant	Form in Granule	Function
Copper	Cu,CuO,Cu_2O,CuS	Reactant: $Cu_2O + 2HCN \rightarrow H_2O + 2CuCN$ $CuO + C''Cl_2 \rightarrow CO_2 + CuCl_2$
Zinc	ZnO,Na_2ZnO_2	Catalyst: $4AsH_3 + 3O_2 \rightarrow 2As_2O_3 + 6H_2O$ Reactant: $Zno + 2HCN \rightarrow Zn(CN)_2 + H_2O$ $Zno + COCl_2 \rightarrow ZnCl_2 + CO_2$
Silver	Ag,Ag_2O	Catalyst: $4AsH_3 + 3O_2 \rightarrow 2As_2O_3 + 2H_2O$
Pyradine	C_5H_5N	Reactant: $C_5H_5N + CNCl \rightarrow$ $CHOC_5H_4NHCN + HCl$

Three impregnation processes are in use:

a. Preimpregnation before activation.

b. Spraying activated charcoal with controlled volumes of concentrated solutions.

c. Immersion of activated charcoal in impregnating solutions, followed by heat treatment.

Preimpregnation and spraying, separately and in combination, are used by most foreign countries. Immersion and redrying was applied to a limited extent by Germany, and to almost all its production by the United States.

The preimpregnation process, already described, is applicable only to manufacturing operations in some phase of which the carbonaceous material is comminuted. Impregnants are added at this step as finely divided solids and as solutions. Because of uncontrollable losses of material as dust in subsequent processing, and a considerable degree of unavailability for reaction of impregnant in the finished charcoal due to blanketing by carbon, the process is wasteful of impregnant. Its advantage is that little additional labor and equipment are required.

In practice, preimpregnation is confined almost exclusively to copper. The element is added either as metal, oxide, or sulfate. Its final form in the charcoal is generally as a mixture of cuprous oxide and metal. The final chemical composition of the impregnant appears to have little effect on its activity.

Silver, as a solution of the nitrate, and pyridine are the impregnants applied to charcoal by spray. This method of application is superior to preimpregnation in that the quantities of impregnant added can be readily controlled, there is little loss of impregnants, and the impregnants are of greater availability to reacting gases. The equipment used is simple, consisting merely of a rotating drum with spray inserts. Concentrated solutions of materials effective in small percentages are used in spray impregnations, so that subsequent redrying of the charcoal is generally unnecessary. The principal disadvantage of the spray process is that the impregnations are not uniform through the bulk of charcoal.

The process of immersing activated charcoal in solutions of impregnants followed by heat treatments is known in this country as whetlerization after two of its originators, J. C. Whetzel and E. W. Fuller. The process has been used in Germany for adding sodium zincate from water solutions to charcoal. The American whetlerization process consists of immersing charcoal in an ammoniacal copper carbonate solution, draining off excess liquid, and drying the granules at a temperature sufficient to expel substantially all the ammonia from the granules (6). A deposit of cupric oxide and carbonate, substantially uniform throughout the bulk of material, is obtained. Other substances, e.g. silver nitrate, may be added to the ammoniacal carbonate solution. Pyridine has also been added in this way, the temperature of drying being adjusted to devolatilize the ammonia without removing the stronger retained organic impregnant. The activated charcoal is fed to a tank containing impregnating solution at constant rate by means of a worm feed. The charcoal drops into the saturating chamber, is mixed with solution by means of mixing paddles attached to the screw of an inclined screw conveyor, propelled by the screw through the conveyor, and discharged into a dryer. The drying, to a charcoal exit temperature of 400°-500° F., is done in a rotary dryer heated by passage of combustion gases through conduits attached to the inside of the rotating shell. Air is generally admitted to the dryer from the discharge end and passed countercurrent to the flow of the charcoal. In certain units, the air is admitted to the dryer through an inner duct leading to the mid-point of the dr and distributed both to the inlet and discharge ends, t giving a countercurrent flow for part and a concurrent f for the remainder of the drying passage.

The air and the vapors evolved during passage of charcoal through the dryer are passed to a recovery tow This is a vertical shell containing a perforated false bott to support a charge of scrap copper loaded into the to from a hopper near the top. The mixture of air and vap is passed upward through the tower to contact the scr copper, over which water is circulated. As the water cir lates it increases in ammonia, carbon dioxide, and cop content, and when of the proper copper content is used f further impregnations. The uncondensed and unabsorb gases from the recovery towers exhaust to the atmosph

BIBLIOGRAPHY

1. Fieldner, A. C., Hall, R. E., Galloway, A. E., "A Stu of the Production of Activated Carbon From Vari Coals and Other Raw Materials," U.S. Bureau of Mi Technical Paper 479 (1930).
2. Hormats, Saul. *Chem. & Met. Eng.* 53, 112-114 (1946).
3. Hawley, L. F. *Ind. Eng. Chem.* 13, 301-302 (1921).
4. Hawley, L. F. U.S. Patent 1,385,826 (July 26, 1921).
5. Urbain, Edward. U.S. Patent 1,610,399 (December 1 1926).
6. Oglesby, N., Wright, H. V. U.S. Patent 1,956,585 (M 1, 1934).

7 FERRO PLANTS READY TO SERVE YOU

Ferro Enamel Corporation
4150 East 56th Street
Cleveland 5, Ohio

Ferro Enamel Supply Co.
Kirkland, Illinois

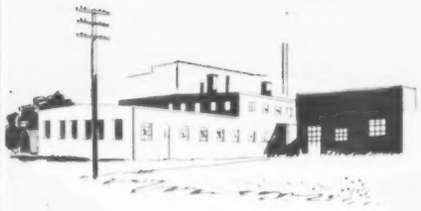
In normal times, these plants are busy producing Porcelain Enamels, Glazes, Color Oxides, Plastic Colorants and Stabilizers, Paints, Paint Driers, Purified Clays, Chemicals, Special Refractories, Electric Heating Elements, Controls, Switches, Gas Controls, and Valves. Ferro also engineers Furnaces, Kilns, Ovens and Complete Plant Equipment for the Porcelain Enameling, Paint Finishing and Ceramic Industries.

Ceramic Supply Co.
Crooksville, Ohio

Tuttle & Kift, Inc.
1823 N. Monitor Ave.
Chicago 39, Illinois

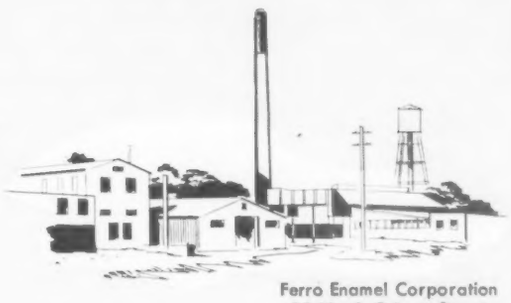
FERRO ENAMEL CORPORATION

4150 EAST 56TH STREET · CLEVELAND 5, OHIO



Ferro Enamel Corporation
5309 S. District Blvd.
Los Angeles 22, Cal.

Ferro Chemical Corporation
Bedford, Ohio



Ferro Enamel Corporation
20 North Culvert Street
Nashville 20, Tenn.

CHEMICAL CORPS KEY PERSONNEL

OFFICE, CHIEF CHEMICAL OFFICER, WASHINGTON 25, D. C.

Chief Chemical Officer, Maj. Gen. Egbert F. Bullene

Chief, Personnel Division, Col. John R. Burns

Chief, Plans, Training & Intell. Div., Col. Hugh W. Rowan

Comptroller, Lt. Col. John J. Hayes

Chief, Safety, Lt. Col. Clifford P. Holm

Executive Officer, Maj. Floyd B. Mitman, Jr.

OFFICE, CHIEF CHEMICAL OFFICER, ARMY CHEMICAL CENTER

Chief, Research and Engineering Division, Col. William M. Creasy

Asst. Chief Cml. Offr. for Materiel, Col. Henry M. Black

ARMY CHEMICAL CENTER, MARYLAND

Commanding General, Brig. Gen. Charles E. Loucks

Commanding Officer, Edgewood Arsenal, Col. David Armitage

Commanding Officer, Eastern Cml. Depot, Col. John P. Youngman

Commandant, Chemical Corps School, Col. Frederick W. Gerhard

Commanding Officer, Cml. Corps Chemical & Radiological Laboratories, Col. Jacquard H. Rothschild

President, Chemical Corps Board, Col. Ralph C. Benner

Commanding Officer, Chemical Corps Medical Laboratories, Col. M. W. Bayliss

Chief, Cml. Corps Procurement Agency, Lt. Col. Carl S. Casto

Commanding Officer, Edgewood Proving Ground, Lt. Col. Emory A. Lewis

DESERET CHEMICAL DEPOT, TOOELE, UTAH

Commanding Officer, Col. Raymond T. Beurket

Executive Officer, Lt. Col. Kenneth A. Cunin

DUGWAY PROVING GROUND, TOOELE, UTAH

Commanding Officer, Lt. Col. Donald E. Yanka

Executive Officer, Maj. Elmer E. Dye

PINE BLUFF ARSENAL, PINE BLUFF, ARKANSAS

Commanding Officer, Lt. Col. Harrison S. Markham

Executive Officer, Maj. T. W. Rogers

ROCKY MOUNTAIN ARSENAL, DENVER, COLO.

Commanding Officer, Col. Crawford M. Kellogg

CAMP DETRICK, FREDERICK, MARYLAND

Commanding Officer, Col. Fred J. Delmore

ATLANTA CHEMICAL PROCUREMENT DISTRICT, 44 BROAD ST., ATLANTA, GA.

Commanding Officer, Col. W. L. MacLachlan

BOSTON CHEMICAL PROCUREMENT DISTRICT, BOSTON ARMY BASE, BOSTON, MASS.

Commanding Officer, Col. W. E. R. Sullivan

CHICAGO CHEMICAL PROCUREMENT DISTRICT, 226 W. JACKSON BLVD., CHICAGO, ILL.

Commanding Officer, Col. Victor C. Searle

DALLAS CHEMICAL PROCUREMENT DISTRICT, 114 COMMERCE ST., DALLAS 2, TEXAS

Commanding Officer, Col. George W. Dorn.

NEW YORK CHEMICAL PROCUREMENT DISTRICT, 111 E. 16TH ST., NYC.

Commanding Officer, Lt. Col. J. F. Escude

SAN FRANCISCO CHEMICAL PROCUREMENT DISTRICT, OAKLAND ARMY BASE, OAKLAND, CALIFORNIA

Commanding Officer, Lt. Col. Hans S. Bendixen

CHEMICAL CORPS OFFICERS WITH THE ARMY FIELD FORCES

Hqs, First Army, Governors Island, New York

Chemical Officer, Col. Walter A. Guild

Hqs, Second Army, Fort George G. Meade, Md.

Chemical Officer, Col. J. W. Mosteller, Jr.

Hqs, Third Army, Fort McPherson, Georgia

Chemical Officer, Col. R. D. McLeod

Hqs, Fourth Army, Fort Sam Houston, Texas

Chemical Officer, Col. James M. McMillin

Hqs, Fifth Army, 1660 E. Hyde Park Blvd., Chicago 15, Ill.

Chemical Officer, Col. H. B. Bramlet

Hqs, Sixth Army, Presidio of San Francisco, Calif.

Chemical Officer, Col. S. E. Whitesides, Jr.

CHEMICAL CORPS OFFICERS RESERVE CORPS INSTRUCTORS

FIRST ARMY AREA

Capt. R. G. Lynch, Office of Sr. State ORC Instructor, Kearny Shipyards, Kearny, N. J.

THIRD ARMY AREA

Col. C. B. Drennon, Jr., Alabama Military District, 4th Fl. Calder Bldg., Birmingham, Ala.

Major E. Escudero, Broad and East Bay Streets, Charleston, S. C.

FIFTH ARMY AREA

Capt. G. E. Allard, 310 Federal Office Bldg., Third Ave. and Washington Ave., S., Minneapolis, Minn.

Major C. H. White, 12th and Spruce St., St. Louis, Mo.

Capt. V. Deptula, Michigan Sr. Army Instructor ORC, 46 Federal Bldg., Detroit 26, Mich.

THEATER CHEMICAL OFFICERS

EUROPEAN THEATER, Col. Thomas H. James, Chemical Division, Hqs, EUCOM (Rear), APO 403, c/o Postmaster, New York, N. Y.

FAR EAST COMMAND, Col. Delancey R. King, Chemical Section, GHQ, FEC, APO 500, c/o Postmaster, San Francisco, Calif.

PACIFIC THEATER, Lt. Col. Timothy C. Williams, Chemical Officer, U.S. Army Pacific, APO 958, c/o Postmaster, San Francisco, Calif.

CARIBBEAN THEATER, Col. R. E. Johnson, Box 477, Fort Amodor, Canal Zone.

CHEMICAL CORPS ROTC INSTRUCTORS

Lt. Col. Woodrow W. Reagan, 1180th ASU ROTC, Massachusetts Institute of Technology, Cambridge 39, Mass.

Lt. Col. M. A. Peerenboom, 2406th ASU, ROTC, The Ohio State University, Columbus 10, Ohio

Lt. Col. Chester Dombrowski, University of Delaware, Newark, Del.

Lt. Col. Lewis W. Duerner, 3216 ASU, ROTC, Instructor, Georgia School of Technology, Atlanta, Ga.

Lt. Col. L. S. Moore, Military Dept., Texas A & M, College Station, Texas

Maj. Leon A. Keif, Military Department, Purdue University, Lafayette, Ind.

paper sculpture by sorcha ceon

THE WISDOM OF EXPERIENCE

assures maximum purity and efficiency in NIALK* chemicals—produced by a pioneer in the field of electro-chemicals.

NIALK	Liquid Chlorine
NIALK	Caustic Potash
NIALK	Carbonate of Potash
NIALK	Paradichlorobenzene
NIALK	Caustic Soda
NIALK	TRICHLORethylene
NIAGATHAL*	(Tetrachloro Phthalic Anhydride)

*Trade-mark

NIAGARA ALKALI COMPANY

60 East 42nd Street, New York 17, N. Y.

CHAPTERS

ARMED FORCES CHEMICAL ASSOCIATION

ARMY CHEMICAL CENTER CHAPTER
President—Fred B. Shaw, Bldg. 330, Army Chemical Center, Md.
Secretary-Treasurer—Mrs. Marie Klug, Materiel Insp. Agency, ACC, Md.

★

BALTIMORE CHAPTER
President—Capt. Paul Bauman, 17 Osborne Ave., Catonsville 28, Md.
Secretary-Treasurer—Howard N. Williams, Pemco Corp., 5601 Eastern Ave., Balto., Md.

★

BOSTON CHAPTER
President & Treasurer—Lt. Col. Chenery Salmon, P. O. Box 2197, Boston 6, Mass.
Secretary—Dr. Charles S. Keevil, Arthur D. Little, Inc., Cambridge, Mass.

★

CAMP DETRICK CHAPTER
President—Maj. H. A. Chichester, Camp Detrick, Frederick, Md.
Secretary-Treasurer—M/Sgt. D. E. Drukenmiller.

★

CHICAGO CHAPTER
President—Morton Hague, 666 N. Lake Shore Dr., Chicago, Ill.
Secretary-Treasurer—James J. Doheny, 86 E. Randolph St., Chicago, Ill.

★

CINCINNATI CHAPTER
President—Carl W. Rich, 2nd Natl. Bank Bldg., Cincinnati, Ohio.
Secretary—Clarence E. Trotter, R. R. No. 2, Loveland, Ohio.

★

CLEVELAND CHAPTER
President—S. B. Elliott, Ferro Enamel Corp., 450 Krick Rd., Bedford, Ohio.
Secretary-Treasurer—C. R. Beyerle, Monarch Aluminum Mfg. Co., Detroit Ave. at W. 93rd St., Cleveland 2, Ohio.

★

COLUMBUS CHAPTER
*President—Don C. Micheau, 415 Merryhill Dr., Columbus, Ohio.
*Secretary-Treasurer—Charles W. Mason, 3323 Westerville Rd. Columbus, Ohio.

★

DALLAS CHAPTER
President—K. George Irving, Irving Machine Co., Tyler, Texas.
Secretary-Treasurer—Charles T. Millis, Dallas Cml. Proc. Dist., 1114 Commerce St., Dallas 2, Texas.

★

EUROPEAN CHAPTER
President—Col. Donald H. Hale, Cml. Sec., Hqrs. 7th Army, APO 46, c/o PM, N.Y.
*Secretary-Treasurer—Lt. Pierce H. Gaver, Hqrs. Eucom, Office Chief Chemical Div., APO 403, c/o PM, N.Y.

★

GA. TECH STUDENT CHAPTER
President—Frank B. Christiphine, 2276 Va. Pl., N.E., P.O. Box 3731, Atlanta, Ga.
Secretary-Treasurer—Eugene B. Norris, 734 Fowler St., N.W., Atlanta, Ga.

★

HAWAII CHAPTER
President—Maj. Timothy C. Williams, 8310th AU, Hawaiian Cml. Depot, APO 957, c/o PM, San Francisco, Calif.
Secretary-Treasurer—Thomas F. J. Zoller, Cml. Div., USARPAC, APO 958, c/o PM, San Francisco, Calif.

HOUSTON CHAPTER
President—Col. J. A. Barnes, Trinity Cement Co., 1515 Commerce Bldg., Houston, Texas.
Secretary-Treasurer—C. W. Roberts, H. K. Ferguson Co., 1 Main St., Houston 2, Texas.

★

JAPAN CHAPTER
President—Lt. Col. David C. Hester, Cml. Sec, GHQ FEC, APO 500, c/o PM, San Francisco, Calif.
Secretary-Treasurer—Capt. Julius E. Majors, 10th Cml. Depot Co., APO 503, San Francisco, Calif.

★

LOUISIANA CHAPTER
President—Harold J. Madden, Ethyl Corp., P.O. Box 341, Baton Rouge, La.
Secretary-Treasurer—Lt. Col. Earl E. Turner, 2955 Hollywood Dr., Baton Rouge, La.

★

NEW YORK CHAPTER
President—Edwin C. Kenton, Evans Res. & Dev. Corp., 250 E. 43rd St., N.Y.C.
Secretary-Treasurer—Lt. Col. Walter E. Spicer, Jr., Lambert Pharmacal Co., 930 Newark Ave., Jersey City 6, N. J.

★

PITTSBURGH CHAPTER
President—Maj. J. F. Matejczyk, O. Hommel Co., Carnegie, Pa.
Secretary-Treasurer—Charles A. Kiernan, Fed. Labs., P.O. Box 266, Pittsburgh 30, Pa.

★

PURDUE STUDENT CHAPTER
President—James Margedant, 1112 Ravenswood Dr., Evansville, Ind.
Secretary-Treasurer—F. C. Meine, 1422 N. LaSalle, Chicago, Ill.

★

ROCHESTER CHAPTER
President—Maj. Henry T. Perkins, 31 Exchange St., Rochester, N. Y.
Secretary-Treasurer—Lt. L. E. Helfrich, 559 Augustine St., Rochester, N. Y.

★

ROCKY MT. ARSENAL CHAPTER
President—K. C. Clifton, 1469 S. Clermont St., Denver, Colo.
Secretary-Treasurer—G. B. Hendershot, 3126 Quitman St., Denver, Colo.

★

SAN FRANCISCO CHAPTER
President—R. G. Newhall, Oronite Cml. Co., 34 Sansome St., San Francisco 4, Calif.
Secretary-Treasurer—J. A. Gast, Carbide & Carbon Cmls. Corp., 30 Battery St., San Francisco.

★

SOUTHERN CALIFORNIA CHAPTER
President—Harry V. Welch, Western Precipitation Corp., 1916 W. 9th St., Los Angeles, Calif.
Secretary-Treasurer—Thomas J. McEniry, 1709 Garfield Ave., S. Pasadena, Calif.

★

WASHINGTON, D. C. CHAPTER
President—Ned O. Kraft, 1200 Ring Bldg., Washington, D. C.
Secretary-Treasurer—R. Donald Rogers, 704 E. Westmoreland Rd., Falls Church, Va.

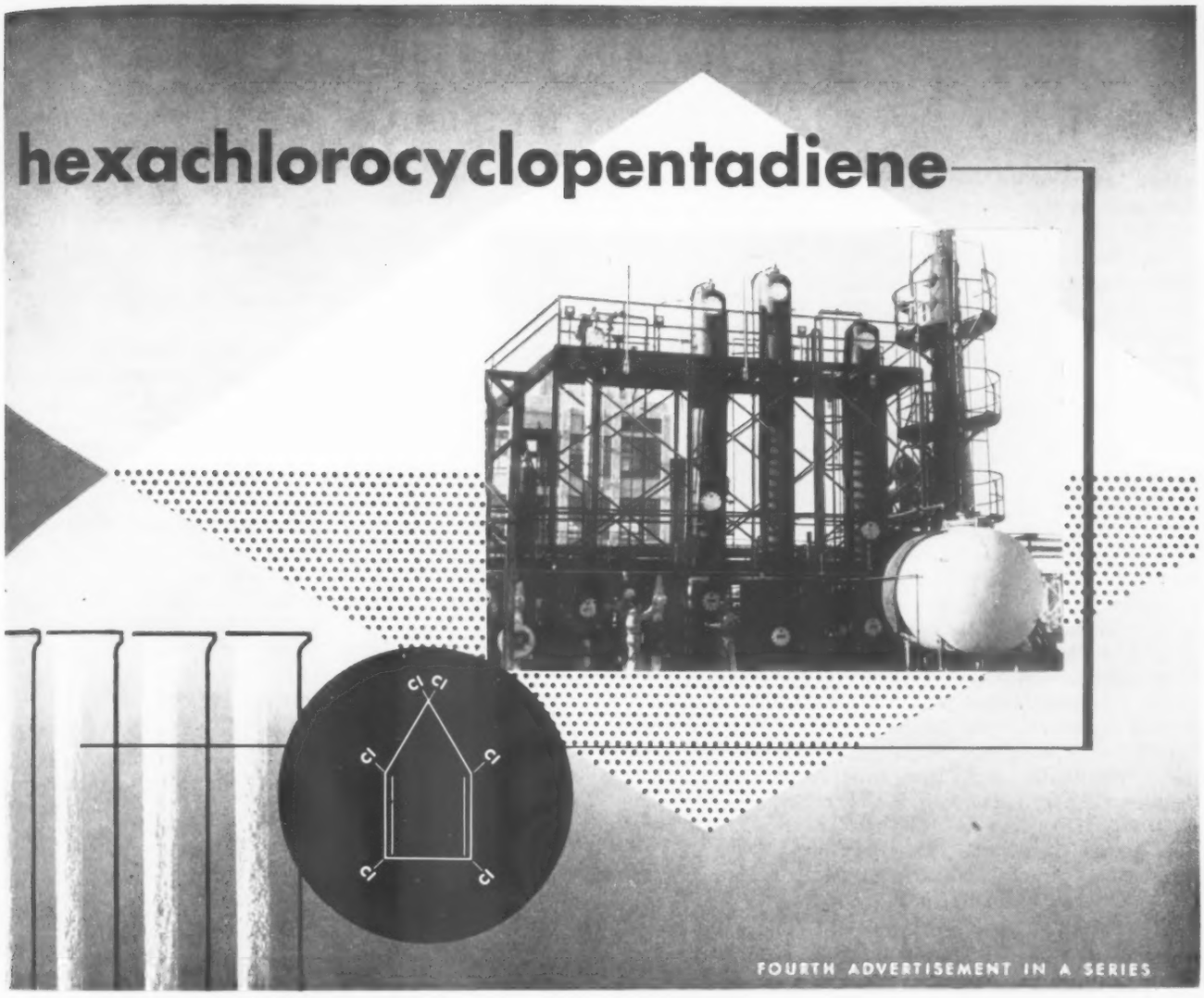
★

WESTERN NEW YORK CHAPTER
President—Col. Clifford L. Sayre, 252 Wabash Ave., Kenmore, N. Y.
Secretary-Treasurer—Samuel Dave Levine, 125 Claremont Ave., Buffalo 22, N. Y.

★

WILMINGTON CHAPTER
President—R. E. Chaddock, Hercules Powder Co., Wilmington, Del.
Secretary-Treasurer—H. J. McCauley, E. I. du Pont, Wilmington, Del.

hexachlorocyclopentadiene



FOURTH ADVERTISEMENT IN A SERIES

Julius Hyman & Company

MANUFACTURER OF UNIQUE CHEMICALS

Discovered in the course of a theoretical study in ionizable hydrocarbon hydrogen*, hexachlorocyclopentadiene lay dormant for a decade as one of the endless number of synthetic chemical oddities on the shelves of the world's research laboratories. Then suddenly, during World War II, interest in hexachlorocyclopentadiene developed in a number of laboratories here and abroad.

Although currently finding use chiefly as an intermediate in the manufacture of potent insecticides, hexachlorocyclopentadiene—because of its unusual structure and reaction possibilities—shows promise of use in a wide variety of fields only now beginning to be explored.

Julius Hyman & Company, a post-war chemical manufacturer located at the Rocky Mountain Arsenal, Denver, Colorado, is the world's largest producer of hexachlorocyclopentadiene**, made by an interesting process unique with this company. Two other important chemicals manufactured by the company are ALDRIN and DIELDRIN. These outstanding insect toxicants were discovered in the Hyman Laboratories.

**Straus, Kollek and Heyn Ber. 63B, 1868 (1930)*

***Samples available upon request.*

Julius **HYMAN** *& Company*

DENVER, COLORADO

LOOK TO HYMAN FOR TOMORROW'S IMPORTANT CHEMICAL DEVELOPMENTS — TODAY

GROUP AND SUSTAINING MEMBERS

OF THE ARMED FORCES CHEMICAL ASSOCIATION

Abbott Laboratories, North Chicago, Ill.
Affiliated Gas Equipment, Inc., Cleveland, Ohio.
Air Reduction Company, Inc., New York, N. Y.
Allen Manufacturing Company, Inc., Nashville, Tenn.
Allied Chemical & Dye Corporation, New York, N. Y.
American Aniline Products, Inc., New York, N. Y.
American Cyanamid Company, New York, N. Y.
American Stove Company, St. Louis, Mo.
American Zinc, Lead & Smelting Company, St. Louis, Mo.
Armstrong Cork Company, Lancaster, Pa.
Atlas Powder Company, Wilmington, Del.
Baker & Company, Inc., Newark, N. J.
Bastian-Blessing Company, The, Chicago, Ill.
Bastian-Morley Company, Inc., LaPorte, Ind.
Bechtel Corporation, San Francisco, Calif.
Bird Machine Company, South Walpole, Mass.
Blaw-Knox Construction Company, Pittsburgh, Pa.
Blickman, S., Inc., Weehawken, N. J.
Bolta Company, The, Lawrence, Mass.
Bridgeport Brass Company, Bridgeport, Conn.
Bristol-Myers Company, New York, N. Y.
Brown Company, Berlin, N. H.
Buffalo Electro-Chemical Company, Inc., Buffalo, N. Y.
Canfield, H. O., Company, The, Bridgeport, Conn.
Casco Products Company, Bridgeport, Conn.
Celanese Corporation of America, New York, N. Y.
Central Foundry Company, The, Newark, N. J.
Chamberlain Corporation, Waterloo, Iowa
Crown Can Company, Philadelphia, Pa.
Dexter Company, The, Fairfield, Iowa
Diamond Alkali Company, Cleveland, Ohio
Dow Chemical Company, Midland, Mich.
E. I. duPont de Nemours & Co., Inc., Wilmington, Del.
Eaton Manufacturing Company, Cleveland, Ohio
Empire Stove Company, Belleville, Ill.
Ethyl Corporation, New York, N. Y.
Evans Research & Development Corp., New York, N. Y.
Federal Laboratories, Inc., Pittsburgh, Pa.
Ferguson, H. K., Company, The, Cleveland, Ohio
Ferro Enamel Corporation, Cleveland, Ohio
Firestone Industrial Products Div., Fall River, Mass.
Fisher-Price Toys, Inc., East Aurora, N. Y.
Fluor Corporation, Ltd., The, Los Angeles, Calif.
Foster-Wheeler Corporation, New York, N. Y.
Fram Corporation, Providence, R. I.
Fraser & Johnston, San Francisco, Calif.
Fuller, W. P., & Company, San Francisco, Calif.
Gasket, Packing & Specialty Co., Inc., New York, N. Y.
Gates Rubber Co., The, Denver, Colo.
General Aniline & Film Corporation, New York, N. Y.
General Dyestuff Corporation, New York, N. Y.
General Tire & Rubber Company, The, Wabash, Ind.
Glyco Products Company, Inc., Brooklyn, N. Y.
Goodrich, B. F., Chemical Company, Cleveland, Ohio
Goodyear Tire & Rubber Company, Akron, Ohio
Gray Stamping & Manufacturing Co., Plano, Ill.
Green Colonial Furnace Company, Des Moines, Iowa
Greer Hydraulics, Inc., Brooklyn, N. Y.
Greiner, Emil, Company, The, New York, N. Y.
Gulf Oil Corporation, Pittsburgh, Pa.
Haertel, Walter, Company, Minneapolis, Minn.
Hamilton Manufacturing Corporation, Columbus, Ind.
Handy & Harman, New York, N. Y.
Harshaw Chemical Company, The, Cleveland, Ohio
Heil Company, The, Milwaukee, Wisc.
Hercules Powder Company, Wilmington, Del.
Heyden Chemical Corporation, New York, N. Y.
Hooker Electrochemical Company, Niagara Falls, N. Y.
Howell Company, The, St. Charles, Ill.
Hyman, Julius & Company, Inc., Denver, Colo.
Industrial Rubber Goods Company, St. Joseph, Mich.
International Nickel Co., Inc., New York, N. Y.
International Silver Company, Meriden, Conn.
James Manufacturing Company, Ft. Atkinson, Wisc.
Jefferson Chemical Company, Inc., New York, N. Y.
Kellogg, M. W., Company, The, New York, N. Y.
Kold-Hold Manufacturing Company, Lansing, Mich.
Koppers Company, Inc., Pittsburgh, Pa.
Kwikset Locks, Inc., Anaheim, Calif.
Lambert Pharmacal Company, St. Louis, Mo.
Line Material Company, Milwaukee, Wisconsin
Little, Arthur D., Inc., Cambridge, Mass.
Mason, L. E., Company, Hyde Park, Mass.
Mathieson Chemical Corporation, Baltimore, Md.
McInerney Spring & Wire Co., Grand Rapids, Mich.
Merck & Company, Inc., Rahway, N. J.
Metal Hydrides, Inc., Beverly, Mass.
Metal & Thermit Corporation, New York, N. Y.
Michigan Chemical Corporation, St. Louis, Mich.
Milwaukee Stamping Company, Milwaukee, Wisc.
Monsanto Chemical Company, St. Louis, Mo.
Mundet Cork Corporation, New York, N. Y.
National Can Corporation, New York, N. Y.
National Fireworks Ordnance Corp., West Hanover, Mass.
Nesco, Inc., Milwaukee, Wisc.
Niagara Alkali Company, New York, N. Y.
Niagara Blower Co., New York, N. Y.
Olin Industries, Inc., East Alton, Ill.
Oronite Chemical Company, San Francisco, Calif.
Parsons, Ralph M., Company, The, Los Angeles, Calif.
Pemco Corporation, Baltimore, Md.
Penick, S. B., & Company, New York, N. Y.
Pennsylvania Salt Manufacturing Co., Philadelphia, Pa.
Pfister Chemical Works, Inc., Ridgefield, N. J.
Pfizer, Chas., & Company, Inc., Brooklyn, N. Y.
Philco Corporation, Philadelphia, Pa.
Phillips Petroleum Company, Bartlesville, Okla.
Pittsburgh Coke & Chemical Co., Pittsburgh, Pa.
Pittsburgh Plate Glass Company, Pittsburgh, Pa.
Rheem Manufacturing Company, New York, N. Y.
Rohm & Haas Company, Philadelphia, Pa.
Rowe Manufacturing Company, Whippany, N. J.
Shell Development Company, Emeryville, Calif.
Sheller Mfg. Co., Dryden Rubber Div., Chicago, Ill.
Sherwin-Williams Company, The, Cleveland, Ohio.
Shwayder Bros., Inc., Denver, Colo.
Smith, Kline & French Laboratories, Philadelphia, Pa.
Snell, Foster D., Inc., New York, N. Y.
Sprague Electric Company, North Adams, Mass.
Standard Oil Company (Indiana), Chicago, Ill.
Standard Oil Development Co., New York, N. Y.
Standard Products Company, The, Cleveland, Ohio
Stauffer Chemical Company, New York, N. Y.
Stewart Die Casting, Chicago, Ill.
Sun Oil Company, Philadelphia, Pa.
Tennessee Eastman Corporation, Kingsport, Tenn.

Texas Company, The, New York, N. Y.
Toledo Steel Tube Co., The, Toledo, Ohio
Ultra Chemical Works, Inc., Paterson, N. J.
Union Carbide & Carbon Corp., New York, N. Y.
Unique Art Manufacturing Co., Inc., Newark, N. J.
United Carr-Fastener Corp., Cambridge, Mass.
United States Rubber Company, New York, N. Y.
United States Testing Co., Inc., Hoboken, N. J.
Victor Chemical Works, Chicago, Ill.
Vulcan Copper & Supply Co., The, Cincinnati, Ohio
Wallace & Tiernan Products, Inc., Newark, N. J.
Westvaco Chemical Division, New York, N. Y.
Witco Chemical Company, Chicago, Ill.
World Steel Products Corp., New York, N. Y.
Wyandotte Chemicals Corp., Wyandotte, Mich.
Zaremba Company, Buffalo, N. Y.
Zenite Metal Corporation, Indianapolis, Ind.
Zenith Plastics Company, Gardena, Calif.

Companies listed in bold face letters are Sustaining Members.

RESERVE OFFICER

(Continued from Page 11)

one will dare challenge us, or if challenging us, will be defeated.

Then the problem becomes how do we build a Reserve in the face of the handicaps? Mr. Merck has talked about it. We know that you're not going to have smart people remain in the Reserve and take the unequal burden of citizenship that they have to assume today that the partial mobilization has disclosed is visited upon them.

First of all, we've got to eliminate the opportunity for discrimination against Reservists. I'm not criticizing employers. All that employers were asking was—"Please tell us who you're going to take or what standards you're going to take them by. And please, quit taking a scientist and making him a gunner just because that was the last thing he did when he was in the service."

We know that's been happening. It's unfortunate, but what the services had to have were gunners at that moment, and the records showed that this man was a gunner. Certainly, that's a failure of the services to plan for adequate records. I'm not criticizing the services. They asked for adequate funds to do it and it was denied them, and they felt that there were other things more important than those records. The individual has the responsibility of notifying his service of any change in his specialty, but as long as nobody insisted on it or asked them for it, they just didn't do it. The result of it was our records were grossly inadequate and inaccurate.

That led to another confusing situation that not only the Reservist couldn't understand—certainly their wives couldn't understand it—even Congress couldn't understand it—and that was we spent many millions of dollars in a Reserve as we did after World War II, with the National Guard very much expanded and the creation of drilling and training units in the organized Reserve Corps, and of vastly expanded Navy and Marine Reserves—and yet when the Korean mobilization came, was it the men who had been receiving drill pay and getting training who were called first—No, it was the so-called Inactive Reserve and the Volunteer Reserve who had received no training since the war, and had received no drill pay—who were the first ones called. That's mighty hard to understand. Unfortunately, while there was a good reason for it, nobody bothered to tell anybody anything. The reason for doing it, ladies and gentlemen, is that what we needed at the outbreak of the Korean invasion was the expansion of existing units of the regular military establishments—Army, Navy, and Air Force. We didn't need more regiments and divisions to begin with. We had to bring the peacetime strength of a company up to its wartime strength. That took individuals. That took enlisted men and junior officers. So, the only practical source for them was the Inactive and Volunteer Reserve. Had we stripped the National Guard and the Organized Reserve units of their junior officers and their enlisted men, because they were getting drill pay, we would have then created another dilemma for ourselves, since if it developed into an all-out war, then the units that we had trained for full mobilization as such wouldn't have been there. They would have been stripped and so, we had to do an unpleasant thing—That was, take them from the Inactive and Volunteer Reserve first.

Recognizing all of these factors, we know we've got to come up with a new system that will eliminate these things. Our new plan will give to industry some guide as to the callability of their employees and will give to the individual some assurance as to his liability status. It certainly will avoid the situation where an individual in the Inactive Reserve is called before those in a training status.

Gentlemen—In September, a committee was created in the Pentagon, made up preponderantly of reserve officers.

This committee has developed a new approach to the whole Reserve organization, which solution was approved by General Marshall, the Secretary of Defense, a week or ten days ago, and which we are now in the process of presenting to the Congress. It is a workable plan that will create a realistic Reserve. Recognizing from now on that there may always be more Koreas, we must be prepared not only for a Korea—but must be prepared for any state of mobilization from zero to a hundred percent and it must be just that flexible.

We are providing a ready Reserve, which will be made up in general of the young men who have not yet become essential to the industry of the country, and who have not yet acquired the liabilities of large family obligations, and they will be in a ready status by the state of their training also. To eliminate discrimination — Every young man, under our concept, on reaching a given age—eighteen and a half—will go into the military service. He will receive basic training and service and thereafter, will have an obligated period in the Reserve. Our present plans call for two years of active service at age eighteen and a half, and then, six years in the Reserve.

Hereafter, no employer can hire anybody in that age group on a discriminatory basis, because everybody in that age group is going to be subject to call, so that there isn't going to be a chance to say—"I'll take Johnny and not Bill, since Johnny won't be called," because they'll both have an equal liability for call. That will eliminate discrimination for those in the ready Reserve.

This ready Reserve will give us the ability to instantly expand our armed forces in an emergency with currently trained personnel, something we didn't have when war in Korea broke out. That, of course, is not going to be enough to provide the foundation for an all-out mobilization in case it develops into a war, and of course, the next time may not be Korea. The next time may not be partial mobilization. The next time the balloon goes up, it may be all-out, so we'd better be prepared for that too.

Beyond the ready Reserve, we expect to build a standby Reserve. The standby Reserve will be made up of those who volunteer to be in it. They will be subject to call only in the event of war or national emergency declared by the Congress. That condition upon their being called wouldn't mean much unless we had a ready Reserve which would make it unnecessary for them to be called short of war.

What some of the people don't seem to realize and I find some of my colleagues in the Pentagon don't seem to realize, have therefore been unsympathetic with the Reserve because some of them griped about the way in which they were called up—is that reservists signed up in the reserve subject to call only in case of war, yet without his consent, his status was changed.

So, they found themselves in an involuntary voluntary Reserve. That's not going to work next time.

So, we are providing now that those in the ready Reserve —and they'll have no choice—they'll have to be in it—will be subject to call by the President at any time that there's an emergency requiring the expansion of the regular forces. Those who go into the standby Reserve will be called only in the event that it's all-out.

However, we realize that we have to make many other reforms in the Reserve system to attract these people into the voluntary Reserve after their obligated period is over. We will have to eliminate the inequities of promotion as between Reserves and regulars that we find now. We will have to see that the records of every individual in the Reserve is kept currently up to date, so that we don't call out a chemist and make him the mess officer, just because when he left the war that's what he was doing—running an officers' club somewhere. We've provided in our new policies that the records will be kept current, up to date, and scientifically evaluated. There will be a medical examination not less than every four years, and a physical report not less than once a year. The skills newly by acquired in civil life or those acquired through Reserve training in a military capacity, will be currently kept on the record. With mechanical machine systems, we will be able to recall the round peg for the round holes, and they will be kept rounded all the time. So, we can eliminate many of the things that we are today critical of—and we have a right to be critical of them. It wasn't anybody's particular fault. The Congress didn't conceive of such a situation. The military didn't—Industry didn't—And certainly, the poor devils in the Reserve didn't conceive of it.

We are facing a situation where we've all got to realize it from now on. We must have a giving by everybody in a much greater measure than we ever did before.

I want to say to you employers, or you who influence employment policies, that it will be wise for you, and good business as well, not only *not* to discriminiate against those who will be in the standby Reserve by reason of the fact that they have assumed a Reserve liability to serve in a war but in fact to give preference to reservists. Let me say to you that if we don't have a Reserve, the cost to you—to industry—will be so many, many times more in maintaining a permanent military establishment than the cost of disrupting your organization occasionally by having reservists called up and having to replace them, that you'll find it'll be just good plain dollars and cents business—to give preference to reservists in employment.

The individual citizen who is the potential Reserve—is going to have to recognize that if this nation is to survive, and he's to pass on to his children, the benefits that he's received, he's going to have to assume greater responsibility in the defense of his country and in his willingness to be subject to be called. No one is going to have a perfect deal, but if everyone will make his proportionate sacrifice, this nation can continue to survive.

DRY FIBROUS FILTERS

BY STUART M. JESSOP, PROTECTIVE DIVISION, CHEMICAL AND RADIOLOGICAL LABORATORIES, ARMY CHEMICAL CENTER, MARYLAND.

Dry fibrous filters are preferred for the removal of airborne particulates from the atmosphere whether the particles are plain dust, toxic smokes, bacteria, spores or radioactive materials. It has been observed that most any fibrous material if used in sufficient bulk will filter these smokes. The more uniform the fibrous mat and the finer the fibers that make up the filter medium, the more efficient the filter. These conditions have been met by the development of special filter papers that are manufactured with standard paper-making machinery. At a fixed air resistance the efficiency increases with the decrease in fiber diameter but the limiting factor is the structural strength of the filter. The modern dry filter is made of a mixture of fine fibers for filtering efficiency and coarse fibers for strength. Another important factor is the rate of air flow through the filter medium. The lower the air flow per unit area the more efficient the filter. One successful type of fibrous filter has an air velocity of five feet per minute through the filter medium and an air resistance of less than one inch water gage. It is water-repellent and mildew-proof.

The filter medium is formed into square or rectangular shapes and sealed into wooden frames with rubber or plastic cement. In this way individual filter units are made. They come in several sizes, the most popular being the one having an air-filtering capacity of 600 cubic feet per minute. The larger the unit the more economical to produce per cubic foot of air per minute purified. Such units are mounted in large frames, honeycomb fashion, so that the cells are exposed to the air stream in parallel, forming filter panels. The filter panels are usually built five cells high and any desired length, depending on the desired air filtering capacity.

Each filter unit is tested for air resistance and smoke penetration at the time of manufacture. The air resistance must be less than one inch water gage. Tests run on this type of filter indicate no appreciable change in performance under extreme ranges of temperature and relative humidity.

As for overload the filters have withstood an increase in air flow of 10 to 30 times their rated capacity and have withstood air pressures of more than 5 pounds per square inch when measured by a gradual build-up or by means of a shock wave. The smoke penetration and air resistance is approximately directly proportional to the air flow up to about double the rated air flow.

This type of filter will function under all weather conditions but must be protected from direct rain or immersion in water. They have been built to operate up to 300° F. but they are not fireproof. In fact they are normally destroyed by incineration. They are fairly resistant to chemical fumes, will withstand chlorine, phosgene and the like, but are not resistant to strong inorganic acid fumes.

The need for "precleaners" depends on the nature, amount and particle size of the aerosols to be filtered. Actual determinations on test filters should be made for every installation. Very fine smokes such as ammonium chloride are not stopped to any appreciable degree by coarse filters and therefore they offer very little protection to the fine filters. Even with smokes of large particle size, enormous quantities are stopped by fibrous filters without much increase in air resistance. It is the air resistance that renders the filters unfit for use; the filtering efficiency is improved by plugging. The expected normal life of fibrous filters in room air is 2000 hours before the air resistance is doubled, that is, before it goes up to two-inch water gage.

The first cost of the fibrous filter unit is approximately 10 cents per cubic foot per minute of its rated capacity. A 600 cfm. filter costs $60.00 and if the life is 2000 hours it will cost 3 cents per hour throughout its life to defray the initial cost. This cost could be cut nearly in half if the units were made as large as is possible to manufacture. The cost of installation, if large panels made of wood were used would, in my opinion, be about equal to a like panel of wood-frame glass windows. For large installations, sub-assemblies of about 25 units of 600 cfm. capacity each could be made and lowered into position by crane and removed in the same manner. The other expense would be the cost of motor blowers having the required air capacity working against a static pressure of three-inch water gage.

The material collected adheres to the filter and is disposed of when the filters are discarded and burned.

6TH ANNUAL MEETING
ATLANTIC CITY, N. J.

The Cocktail Parties started on time, finished behind schedule.

A BROTHER SERVICE

(Continued from Page 9)

us has a civilian counterpart. When a firm accepts a c tract with us, it doesn't involve just a simple re-tooling eration; it generally requires a complete change in pl operation. For this reason alone, we find it most profita to work with civilian industry as much as possible, es cially in peacetime. Industry must have some knowledge our work, and plan accordingly, if it is expected to do share in an emergency.

A part of this successful program can be attributed that fact that much of our research and developmental wo is accomplished by civilian industry working under co tract. Naturally, some of it is done within our own Chem cal Corps laboratories by military and civilian scientist However, when it is possible, we seek to spread this wo over the widest possible segment of the chemical, and allie industries. We do this by letting contracts with hospita universities, private and industrial research laboratorie scientists and commercial firms which can do the job.

Once the basic work for an acceptable new project ha been completed, we must think of the manufacturing an procurement phases. Sometimes this work is done with our own military laboratories. Generally, though, it turned over to civilian industrial agencies, for they will b the ones called upon for large-scale manufacturing shou the time come for regular use of the item.

Now the principle of procurement planning is one thing The procedure of putting it into operation is something els It is not an easy job, nor is it one that can be done ove night. In procurement planning the situation boils down t the fact that there must exist a cooperative spirit betwe the military and industrial representatives. Otherwise th job becomes impossible of accomplishment.

Prior to the outbreak of the Korean war, the Chemic Corps procurement districts were engaged in procureme planning almost exclusively. It was tedious work for bot sides. However, it was carried out on a smooth give-and take basis. This prior planning has paid off in dividends fo national defense. We are obtaining our materiel objective with a minimum of delay and confusion.

It was not until October of last year that the Corps wa given the green light to go ahead and start procureme operations. Our stockpiles were adequate, but they had t be replenished as the Korean conflict lengthened. Just ho well this prior planning by the Corps and industry had bee carried out may be illustrated by the fact that the Bosto procurement district, alone, let nearly 30 millions of dollar worth of contracts between October and February.

I use Boston's work as an example because it is charge with the procurement of all protective equipment, and th gas mask program has been our largest single factor with in the past year.

On a Corps-wide basis, we have let some 17,000 procure ment contracts, including purchase orders and contracts fo other services, since July 1, 1950. The total dollar value o these contracts amounted to more than $70,000,000. True these figures might be considered small in the light of th whole Department of Defense program which saw nearl $8 billion worth of contracts let in the first nine months o Fiscal Year 1951, for the procurement of major materie and supplies. However, it must be remembered that th Chemical Corps is one of the smallest units in the defens organization and the role we have played so far in Kore has not been too large.

The figures I cite this afternoon pertain not just to th Army, but also to the air and sea services. Our mission is so broad that what we do on the Army level, must also b done for the Air Force and the Navy.

As a result, the Chemical Corps will place with private industry approximately $281,000,000 from funds available from Fiscal Year 1951. More than half, 56 percent of this amount was allocated to us by the air and sea services for buying chemical equipment and munitions needed by them. The Air Force allocation amounted to $156,000,000 while the Navy turned nearly two million dollars over to us for their needs.

I think we are all conscious of the fact that the very bedrock of our democracy is the small independent enterprise—the small business. Because your Government is so firmly aware of the need for freedom of enterprise, its policy at every level is to preserve small business and to encourage its growth and development.

Of 17,000 contracts the Corps let in the first nine months of the Korean operation, approximately 80 per cent of them were made with small business firms.

It is interesting to note that nearly one-third of the AFCA's group and sustaining members can be classified as small business firms. It is a wholesome indication of the solid basis upon which the Corps and industry has built its partnership.

I might add that the addition of a small business specialist to the staff of each of our procurement districts is another step forward. These specialists, who will devote their full time to bringing small business concerns into the military production programs, can be very useful to big business as well. I feel that in time their services will be invaluable in giving advice on possible subcontractors for our larger prime suppliers.

The contract figures I cited tell only a part of the story—the prime contract part. Because so many of our military dollars are tied up in major items—items which small business cannot possibly produce as prime contractors—it is obvious that a great percentage of the work small firms obtain is in the form of subcontracts.

The field of subcontracting is so vast, and in some cases so complicated that complete and accurate reports on it would necessitate a greatly augmented clerical staff. However, we estimate that under 2,500 prime contractors doing business with the Chemical Corps as of March 31, there were in the neighborhood of 2,800 subcontractors.

Time does not permit detailed explanation of our procurement system. Recently we changed our method of dissemination of procurement information. This new method was explained in detail in the April issue of the AFCA JOURNAL, and has also received considerable publicity in other trade press. Copies of the news release on this method are available to you here today.

Suffice it to say that our procurement program is completely decentralized. We buy nothing in Washington. You can save much time, money and effort by contacting the Chemical Corps Procurement District nearest your plant location, where you can obtain full information, including specifications and drawings, on all of the items the Corps is procuring.

The next step, if you are interested in a contract for a specific item, would be to visit the office having the responsibility for procuring the item and seek negotiation of a contract.

By maintaining complete information on file at each of our district offices regarding all the items the Corps is procuring, we hope to save potential contractors the inconveniences of having to travel from office to office in search of defense work.

Until December 16 of last year, with rare exception, we did all of our procurement by advertising for bids. We still do a limited amount of buying in this manner. However, in December, President Truman declared a national emergency which paved the way for the armed services to use the direct negotiations method of purchasing.

Previously, awards were made on a strict price basis and the Corps had little opportunity to take into account planned suppliers or to evaluate production capabilities. That procedure is excellent for stock-type, off-the-shelf items, but it is not easily adaptable to our many items which have no civilian counterparts.

My staff has estimated that direct negotiations have speeded up buying by as much as 30 to 120 days.

Savings are also accomplished dollar-wise in the determination of contract prices through direct negotiations and through the inclusion of contract price redetermination clauses. The use of letter contracts pending the execution of definitive contracts under direct negotiation also speeds up purchasing and deliveries.

In addition, procurement by negotiation facilitates the purchase of tools which may be required for the production under contract. Possible adjustments of costs occasion by revision of specifications and drawings may be more readily accomplished in procurement by negotiation. The buying of increased quantities of an item also is greatly expedited by means of supplemental agreements where the item is already under current procurement by negotiated contract.

It is my opinion that direct negotiation also makes for better competition.

Naturally we do not handle negotiated contracts behind closed doors, nor do we deal with just one firm.

The Chemical Corps is obligated to obtain the fairest

possible price to the Government and at the same time spread military procurement over as wide a basis as possible, with particular attention paid to the position of the small businesses in terms of giving them a maximum opportunity to participate.

In order to maintain this competition, the procurement agencies contact several known sources who qualify as producers of the item. These firms may be ones with whom we worked in the procurement planning program, or firms which have offered their services and demonstrated their capabilities, or manufacturers who have been recommended to us by other agencies.

These sources are apprised of the needs and submit their proposals. We then pick the two or more propositions that appear to be to the best interests of the Government and start negotiations, finally choosing the firm whose proposals are the most advantageous to our needs.

I am justifiably proud of the tremendous amount of work the Chemical Corps and its procurement districts have done in the past 11 months, especially since our Congressional appropriations are comparatively small. Private industry has been most cooperative and helpful, particularly in attempts to reach deadlines for rush orders.

For example, last June—just three days before the Korean war started—an Ohio firm accepted a contract to deliver an Incendiary Fuel Service Unit by June 30, 1951. However, in view of the urgent need for the item, the contractor redoubled his efforts to reduce delivery time and provided us with the first unit on December 19, 1950—in less than half the time expected.

This feat was even more remarkable in that the contractor faced many unforeseen delays that were beyond his control. The work was started from scratch and included the necessary research and development that went into the design and fabrication of the very complex unit. The contractor supplied us with three more of the units within a month on a supplemental order.

Or, consider the joint efforts of several firms in regard to a rush order for Napalm. Early in December we received requirements for many thousands of pounds of Napalm thickener for use by the Air Force in Korea. It had to be delivered within 30 days. Of the nine firms that went to work on the project, seven met their deadlines. This rush order completion was possible only because these firms stopped operation of parts of their regular business.

Incidentally, the fact that two of the firms did not meet their contract obligations did not cause any harm. Our stockpiles of materials have been adequate to forestall any shortages.

I don't believe any of us here today can answer the question: "What of the future?"

However, we can't leave the future to chance. We must stand prepared for any eventuality. As a part of the preparation, and in fulfillment of our present obligations, the Chemical Corps anticipates placement of 600 million dollars with private industry for the Army, Navy and Air Force in Fiscal Year 1952. At least that is how our budget planning figure stands at present.

By the end of next month, we expect to have obligated more than 100 million dollars for facilities expansion, while in the fiscal year starting in July, the figure may reach as high as $150 million. This program includes the rehabilitation of our stand-by plant system.

To date, our participation on the Korean battlefront has been of a limited nature. Organic Chemical Corps troops are in action in Korea, however. Chemical maintenance units are providing frontline maintenance service on all items of chemical equipment, including mechanized and portable flamethrowers, smoke generators and decontamination apparatus. Although the latter two items haven't been used so far, they are on hand and ready for action.

The Chemical Corps-developed 4.2 mortar is seeing much action on the front. The Infantry and Marines both use it as an organic weapon, while Chemical Corps mortar troops are providing support to the UN units not equipped with this powerful rifled-barrel mortar that packs the punch of a 105-mm. howitzer. The 4.2 mortar is the second biggest contribution we are making in the actual fighting.

The number one contribution is Napalm—the greyish granular powder that jellies gasoline. Of all the single munitions of war, Napalm best exemplifies the unification spirit.

In the first place, the Chemical Corps is purchasing Napalm for the ground, seas, and air services.

The Infantry uses it in tank-mounted and portable flamethrowers: The Marines use it in the same way, while their air arm joins the Air force and the Navy pilots in dropping bombs of Napalm-jellied gasoline on the Communist forces with devastating effects.

Biological and radiological agents as weapons are as yet unproved in warfare. Chemical warfare has advanced out of the infancy stage of World War I, and evidence indicates that other nations have experimented with new and untried forms of toxic chemical warfare.

Therefore, we cannot afford to disregard the potentialities in these fields. We are in a shooting war, and we must be prepared to use all of the weapons at our disposal should the need arise.

We must be ready to defend ourselves—our country, our homes, our industries, and our free-thinking way of life—with all the weapons available. Neither the Chemical Corps, nor our "brother service," the chemical industry, can be

laggard in the preparation necessary for this type of warfare, if it becomes necessary.

In the final analysis, the very existence of your organizations may depend upon the role you are now playing, and the sacrifices you may be making, in helping to arm the arsenal of democracy. Preparedness of both industry and the military is a tangible form of insurance in this highly scientific day and age. The work we are doing today to further the fighting effort in Korea, and the plans we are making for the future preparedness, may one day prove to be the deciding factor in maintaining our democratic way of life.

The wonder weapons we now are working on are expensive, but they can prove a wise investment. The part they play in the arsenal of democracy is the basis for our hope of avoiding World War III. Therefore, we must continue an extensive scientific program aimed at equipping our forces, and the forces of our allies, with such advanced and superior weapons that should they be put to use, they can overcome the overwhelming numerical advantage of our potential enemies. It is an enormous undertaking, but American industry has shown its fitness for the task.

I feel that the Chemical Corps and the chemical industry have achieved a great start toward the realization of this task. It is a job that will take all of the skill and knowledge we can muster among the military and the civilian scientist, engineer, and industrialist.

I am confident that you men of industry will continue to help me carry out the many responsibilities of my office. I seek and encourage your advice and collaboration. My office in Washington is always open to those of you desiring to contact me.

This convention represents the finest spirit of civilian-military partnership, and we of the Chemical Corps are proud to be a part of it.

I am sure that the Armed Forces Chemical Association will continue to produce not only a more complete understanding of our mutual needs, but even more important, will contribute to the maintenance of the military posture we need to prevent further aggression and which should always be our overriding purpose.

And, in closing, I'd like to make one observation that I feel we can all be grateful for.

We are not here today by direction or in the repressive atmosphere that would result were this a police state—we have come voluntarily, as patriotic citizens seeking to preserve the freedoms we enjoy, and which freedom-loving people everywhere are seeking. We are here voluntarily, giving and seeking aid in the fight toward a common goal.

Only a continued close partnership between industry and the military will insure us that this will always be our privilege.

COL. CARTER RETURNS TO ENGLAND

Left to Right: Lt. Col. Glyn E. Carter, Mrs. Franklin, Mrs. Carter, Lt. Col. Pete H. A. L. Franklin, the new British Liaison Officer at Army Chemical Center Maryland.

Lieutenant Colonel Glyn E. Carter, who has been t British Liaison Officer at Army Chemical Center sin August of 1948, left recently with his wife and daught to return to England where he will be assigned in t War Office in London.

His duties as British Liaison Officer were taken ov by Lieutenant Colonel Peter H. Franklin who arrived fro England on the 8th of April.

Colonel Carter, his wife, Marie, and daughter Jane we the guests of honor at a farewell reception at the Gunpowd Officer's Mess prior to their departure for England.

Colonel Carter is a member of the Royal Engineers, regiment which coordinated with American troops in t Normandy Invasion during World War II. He also serv through the North Africa, Sicily, and Italian Campaign

Prior to his assignment at Army Chemical Center a Liaison Officer, he was stationed in the Middle East, on t staff of GHQ in Egypt. A veteran of 17 years of milita service, Colonel Carter is a native of Newport, South Wale

Lt. Col. Franklin, who is now the British Liaison Offic served with the Essex Regiment in Colchester, Engla prior to embarking for the U.S. and his present duties Army Chemical Center.

His 16 years of service include duty in Palestine, Su Canal Zone, North Africa, and later India and Burm where he was twice wounded.

While in Burma, during World War II, Col. Frank was in the siege of Kohima, which was the key city the supply route for General Stilwell's troops.

Following the end of World War II, he was assigned Chief Instructor at the Joint School of Chemical Warfa at Winterbourne Gunner, Wiltschire, England.

BOOK REVIEWS

MAP AND AERIAL PHOTOGRAPH READING. The Military Service Publishing Company, Harrisburg, Pennsylvania, 1951, 3rd edition, 165 pages, $2.75.

Most of us who have served in the army at one time or other have been exposed to courses of instruction in map and aerial photograph reading. For those who wish to review their knowledge in this field and be brought up to date, here is a well-illustrated reference book which covers the subject in a most comprehensive manner, as evidenced by the following chapter headings: Map Projections; Introduction to Map Reading; Location; Distance, Scale, and Time; Elevation and Relief; Direction; Map Reading in the Field; Ground Navigation by Dead Reckoning; Foreign Military Maps; Introduction to Aerial Photograph Reading; Aerial Photograph Identification; Aerial Photograph Reading; Stereovision; and Restitution of Aerial Photographs. Each chapter gives a number of questions and exercises, with answers at the end of the book. A typical map (Fayetteville sheet), a protractor, and military grid coordinate scales are inclosed in an envelope which accompanies the book.

ORGANIC SYNTHESIS, VOL. 30. Edited by Arthur C. Cope, John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, New York, 1950, 115 pages, $2.50.

Continuing the Wiley series on satisfactory methods for the preparation of organic chemicals, this thirtieth volume gives procedures for the preparation of 40 compounds and the intermediates required for making these compounds. The format and typography are up to the usual standards of the preceding volumes of the series.

IDENTIFICATION OF MOLECULAR SPECTRA. R. W. B. Pearse and A. G. Gaydon. John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, New York, 1950, 2nd edition, 276 pages, $8.50.

This book (8 by 11 inches) contains photographs of band systems, tables of wave lengths, and other data for making accurate identifications of molecular spectra in the wave length region from 10,000 A to 2,000 A. The table of persistent band heads occupies 37 pages arranged in in descending order of wave length. This is followed by tables of individual band systems which occupy most of the remainder of the book (211 pages). These tables are arranged in alphabetical order of the chemical symbols of the molecules concerned. Prior to the publication of the present volume, investigators have found it necessary to search through many books and original papers, or to calculate band positions from tables of derived constants in order to identify a system of bands. Such a tedious job is no longer required, thanks to the labors of these two British scientists, Drs. Pearse and Gaydon.

A GERMAN-ENGLISH DICTIONARY FOR CHEMISTS. Austin M. Patterson. John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, New York, 1950, 3rd edition, 541 pages, $5.00.

The first edition of Dr. Patterson's well-known dictionary appeared more than thirty years ago. It rapidly became an indispensable aid to students of chemical German, and to chemists and chemical engineers with some knowledge of German who needed a good dictionary to assist them in translating papers in that language. The vocabulary of the third edition has been enlarged to an estimated total of 59,000 terms; the more important additions being in the fields of chemical technology, electronics, and warfare. German chemical warfare terms are very well covered. For example, there are 23 definitions of military terms derived from the word for fog or smoke, *Nebel;* and hundreds of other terms in our field. Your reviewer, who first began to use Patterson's dictionary in 1921, finds the new edition more valuable than ever.

ORGANOPHOSPHORUS COMPOUNDS. Gennady M. Kosolapoff. John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, New York, 1950, 376 pages, $7.50.

For the past ten years, Professor Kosolapoff has conducted and published much research in the field of organophosphorus chemistry. Here for the first time in the English language we have a comprehensive monograph on the subject. In addition to his own work in the field, the author has covered the journal and patent literature so thoroughly that the book contains references to more than 1800 literary contributions to the chemistry of organic phosphorus compounds. Because of his ability to read the Russian language with ease, Kosolapoff has presented to American chemists the details of research which were previously available only in abstract form. We are somewhat disappointed that the subject index (there is no author index) is so general that locating information on individual compounds is rendered difficult for those not expert in this subject. We believe also that the average chemist would have liked to have had the hundreds of organophosphorus compounds identified by name as well as by formula. We realize that the nomenclature of these compounds is still unsettled, but it appears to us that the system proposed by the committee appointed by the American Chemical Society could have been adopted for this monograph. Your reviewer, however, does not wish to detract from the value of Kosolapoff's very excellent contribution to this important branch of organic chemistry.

THE MILITARY SITUATION

(Continued from Page 7)

remains to be seen. Even with the most intensive effort in keeping with the seriousness of their situation, the building of the necessary defense forces will be a most difficult task. I am confident that our allies, if fully supported by ourselves, will succeed in building the forces needed to meet this threat.

So much for the European peninsula of the continent of Eurasia.

If we move our attention eastward along the southern border of the great red area, we find the Turkish nation holding firm and fully deserving every bit of the military assistance we are providing them. This is no new situation for the hardy Turks. For centuries they have beaten back repeated attempts of Russia to overrun their country. To date, they have always been successful.

Adjoining is the nation of Iran which has been subjected to continuous pressure from the north and is now troubled by internal political difficulties. It appears that these are troubles which must be worked out internally. This historic country produces a substantial percentage of the world's oil supply, a supply that would be most useful to the fast expanding Russian military machine. It is also a supply that is almost essential to our allies in Western Europe.

To the south of Iran, across the Persian Gulf, is the Arabian Peninsula, beneath which lies the world's greatest known pool of oil. This entire area of the Middle East is extremely important both from the standpoint of raw materials and for its strategic location. Once in the days of the dominance of sea power it controlled the so-called life-line of empire through the Mediterranean, Suez Canal, and the Red Sea. This area is no less important today as a strategic location for the air bases necessary for the support of air power.

Air warfare must be conducted from air bases. The location of such bases is of primary importance to any global strategy based on the employment of air power.

So we have in the Middle East a group of small nations which possess no great military strength but are extremely important both to us and to the Russians because of their location on the flank of the great Asian land mass and because they cover a great pool of oil essential to the healthy industrial life of the Western Powers.

Moving our attention eastward from Iran we cross one of the most rugged areas on the face of the earth—the mountains of Afghanistan and the Himalayan range of northern India. These ranges are a substantial obstacle to limit the advance of surface forces. However, they are not significant in the operations of air forces.

Moving further east beyond more extremely rugged country on the Burmese-Chinese border, we find the Viet-Minh armies of the Communists in Indo-China besieging the brave French and Indo-Chinese defenders of Hanoi, Saigon, and other coastal areas of Indo-China. Indo-China is the last barrier between Communist China and the crowded islands to the south, rich not only in people but also in rubber, tin, and other strategic materials. Southeast Asia is also important because it is one of the few areas of the earth that produces a considerable surplus of food. Here again military forces friendly to us are on the defensive and are holding successfully in spite of continuous pressure and a large commitment of French resources.

Off the Chinese coast are the Philippines, not threatened with open invasion, but seriously disturbed by a strong internal Communist military force.

Northward, the island of Formosa, a key stronghold in our Pacific defenses, is protected from invasion by the presence of our fleet. No matter what their views on global strategy, all our military leaders, General MacArthur, General Bradley, and the Joint Chiefs of Staff are completely in agreement on this.

Still further northward the islands of Japan are also protected largely by our sea power and air power.

I have traced the ragged and shifting line of Communist advanced toward the southern edge of the continent of Asia which is so rich in human and natural resources. The Russian advance in Europe has been checked by the firm attitude of North Atlantic Treaty nations and not by military action or by military power existing there. Along the southern borders of Russian power there has been no unified defense, and east of Turkey Russian political and military gains and political influence during the past few years have been most threatening. Active military opposition exists today only in Indo-China, Formosa, and Korea.

In Korea and Indo-China the land forces of the Western World are in direct contact with Communist hordes. In Indo-China a fierce struggle, little appreciated by many of us, has been going on for a long time. Thousands of French and Indo-Chinese troops have been involved in a most bitter campaign of advance and retreat. The struggle in Korea is less than a year old. It is a focus of our attention today because of the commitment of our ground, sea, and air forces in actual war to blocking the advance of Chinese Communist armies, aided and abetted by Soviet Russia, determined to drive us from that peninsula.

I would like to emphasize that the Communist advance now has taken over the entire Pacific coast of the Asiatic continent with the exception of the relatively small beachheads on Korea and Indo-China, and that from Indo-China eastward to Turkey there is no unified resistance and very little military strength of any kind. Our own ground forces are able to hold on in Korea largely because it is a peninsula only one hundred miles in width. With dominant sea and air power our ground forces have been able to hold this narrow front against the massive weight of manpower thrown against them.

The globe as we examine it today looks something like a huge danger signal with the red tide rolling down toward the equator and building its strength for a possible move to the west. We and our allies hold today merely the remaining western half of the peninsula of Europe—a very small appendage to the continent of Asia, plus tiny beachheads in Indo-China and on Korea. Nations along the long southern front of Communist power are relatively defenseless.

The picture, however, is not quite as red as the picture I seem to have painted. It is the old-fashioned picture in which the military situation is viewed entirely in the light of the surface situation.

Air and sea power are our two powerful and effective counter-agents in what would be otherwise a dismal picture. The U. S. is not the largest nation and not the most populous nation on earth, but it is the greatest industrial nation. It has produced the world's greatest Navy—a Navy capable of halting the advancing flame of Communist military power at the coasts of all the major seas. The Navy, with the Air Force, is capable of preventing the movement of Communist military forces from the land mass of Eurasia to the peripheral islands and continents of the non-Communist world.

This same industrial power which has already created the world's greatest Navy also is capable of creating the world's greatest Air Force. We believe that today our Air Force is second to none in quality, although in fact outnumbered by the Soviet Air Force.

This is our greatest military hope today. The great Asiatic land mass—which has never been decisively invaded nor

conquered—is by no means invulnerable to penetration by air. It is true that the great size and depth of the continent makes air penetration an even greater problem than our long over-water raids from the Marianas against Japan in World War II. But the improved performance of recently developed airplanes makes the penetration feasible. The terrific destructive power of atomic weapons makes such a penetration a most dangerous threat to the sources of Russia's growing military power. Many of the world's military and political leaders have stated their belief that this counter-threat to the massive power of the Russian ground army has been the major influence in halting—or at least postponing—the movement of that army across Western Europe.

The most widely acknowledged factor in deterring Soviet Russia from overt aggression is the stockpile of atomic bombs possessed by the U. S. *and* the ability of the U. S. to effectively deliver them and to destroy or seriously cripple the key industrial complexes, major cities, and other strategic targets in the Soviet Union. This ability has become the shield behind which the nations of the free world, and especially of the Atlantic Pact, are undertaking their rearmament programs to restore the balance of military power between them and the Soviet Communist World. Without the assurance and belief that this ability would be used in support of their own defense, the European nations would likely neither have joined the Atlantic Pact nor undertaken to rearm themselves.

The primary object of the North Atlantic Treaty is to deter, not to wage war. The second object is to organize for the most effective collective action to wage war if it is forced upon the Treaty nations. In the fulfillment of these objects, the U. S. Strategic Air Command, as both the greatest deterrent force and the most effective striking force, is the most vital military factor behind this defensive alliance of free nations.

But here we must remember that the potentialities of air power are not all in our favor. The Russians too, have air power in great quantity. They have a huge tactical air force equipped with a growing percentage of modern jet aircraft. By "tactical air force" we usually mean "short-range" air force, equipped and trained to participate in the land battle.

Since they possess the dominant ground force of the world, the Russians have concentrated on providing this ground force with all the air power it needs. Any hope of effectively resisting this Russian ground force must depend on knocking out the air force that is designed to cover and support it.

Until *we* have sufficient air power to give ground forces on our side protection from enemy air attacks, it is pointless to worry very much about comparative strength on the ground. Only after we have secured control of the air can we provide the needed air support for outnumbered forces on the ground.

Air power has many limitations. It is a heavy weapon, like artillery, and it works best against concentrations of men and materials. It is least effective after troops are dispersed along a battle line as in Korea.

But there is today no substitute for air power, even in surface operations. No army and no nation can survive indefinitely under the constant pounding of a powerful air force. The air battle decides who is to do the pounding and who is to receive the blows.

An air force which has been forced to go on the defensive against a superior air force is fighting a losing battle, and its doom is sealed if the superior air force is capable of pressing its advantage.

That is what we did to Germany, and that is what we did to Japan. Winning of the air battle in each of these wars was the necessary prelude to any other kind of decisive action. That is why I say that our first concern, regardless of our strength or weakness elsewhere, must be the battle for air supremacy. In recent wars that has been the first battle to be decided, and it is difficult to see how any war in the future could be won if the air battle is lost.

I have stated that the Russian air force is primarily a short-range air force built to pace the advance of the Russian land army. The Russians, however, have also awakened to the requirements for a long-range air force. We are partly responsible for this awakening.

During the War, our Chief of Staff, General Vandenberg, headed a mission whose purpose was to impress the Russians with the effectiveness of our long-range air force against Germany and to seek their support in the long-range operations of our strategic bomber force. The Soviet Air Force of World War II had no capability in this field. Realizing the potential of a long-range strategic air striking power, the Russian Air Force since the War has developed a strategic long-range force based upon a copy of our B-29's, a few of which landed in Soviet territory and which were never returned to our control.

Building a strategic air force has not been easy for them. The long-range, high altitude airplane represents the highest development of aeronautical science. So far as we know, the Russians cannot challenge our leadership in this respect, but they have successfully copied our B-29's in a model they call the TU 4.

We think they have several hundred of these planes now, and several hundred B-29's can do a terrific lot of damage —as we proved in Japan—even with conventional bombs. With a probably growing number of atomic bombs available to the Russian air commanders, the damage they can do with their strategic force is also increasing.

You may think that our ability to defend against atomic attack should have increased relatively as fast as the Russians increased their long-range offensive capability.

The airplane is a long-range weapon. In a sense it is a projectile. After it is launched toward its target it travels through vast areas of space at great speed. Elaborate and extensive installations are required even to discover that it is on its way. A whole network of these radar installations is necessary to follow its path. A great number of high performance fighter planes stationed along the thousands of miles of possible approaches are necessary to intercept it and to attempt to shoot it down.

At its best it can only blunt an air attack once launched. No attack of our bomber forces in World War II was ever stopped short of its objective. We must concede the same capability to a determined enemy.

In air warfare, as in every kind of struggle from a fist fight on up, we win by delivering more and heavier blows than we receive. We cannot win by simply trying to ward off blows directed against us.

It is true that as the Russians increase their ability to deliver bombs against us we must improve our air defense as much as possible. But it is even more important that we improve our ability to strike back. We have to continue improving and strengthening our Strategic Air Force, and we have to make sure that it can deliver more and heavier blows against an enemy nation, its military bases, and its industrial centers than that nation can deliver against us.

And we must be sure that we are prepared to sustain our offensive until our enemy acknowledges defeat.

Let us take a last look at our globe. We have been talking about the east and the west and the south of the continent of Eurasia which is largely in the hands of a threatening and hostile nation. I have emphasized the importance of holding wherever we can hold, without commitment of our strength except in decisive areas. But the greatest success in these efforts will not provide us with a protective roof over our heads.

Soviet Russia not only owns more air space than any other nation—her air bases encircle half of the entire Arctic—Russian planes have direct access to our own homeland from many directions over the vast open area that surrounds the North Pole.

Russians planes flying from any point along four thousand miles of Russian Arctic coastline can reach more of the North American continent than they could reach by flying from London.

An air defense system at best is only second best. Our best protection is our ability to strike back at the source of attack with our long-range air force.

To do this with the greatest effect, we need air bases in other areas of the world as well as bases on our own continent and on islands of this hemisphere. The freedom to use such bases is one of the most important considerations in our dealings with our allies and other friendly nations. The increasing range and performance of our planes and the careful selection of base sites must contribute to this nation's ability to control its own military policies and guarantee its own security.

In emphasizing the importance of the counter-blow, I do not wish to minimize the importance of holding—through the judicious employment of our dominant sea power and our ground forces with adequate tactical air support—the areas of Western Europe with which we are now allied. There are many reasons why we must prevent the spread of Soviet power and control. In addition to our loyalty to our allies, we have the practical consideration of saving the people, the resources, and the machinery of these areas to aid us rather than the enemy.

But as we look at the global picture, we see that our ability to hold in many areas at once is necessarily limited. Except for our ability to take the offensive through the air, we might have to accept a long succession of defeats and retreats toward the coasts of Eurasia.

The advance of air power, which is so frightening to all of us, holds at the present time an even greater threat for the enemy. So the situation is not as hopeless as our view of the surface of the globe at first appeared to indicate.

It is true that the greatest land mass of our hemisphere is now dominated by a spreading area of red, and that in only a few places on its borders is there a military force capable of holding against it for any appreciable period. But it is also true that our globe is surrounded by a great envelope of atmosphere that is a potential avenue of approach to every spot on the surface beneath it.

Since the last War, the usable depth of that atmosphere has been increased from five miles to almost ten miles. We have more than doubled the distances we can fly. We are building planes that can double the speed of those we used in the last war.

As long as our ability to use this envelope of atmosphere that surrounds the globe increases more rapidly than the ability of our enemy to use it, as long as we continue to possess the greatest Navy on earth, and as long as we have an adequate and well-equipped army to hold the bases that are most essential to our efforts, we should have every confidence in the survival of our nation in any contest to preserve our institutions, our freedoms, our American Way of Life.

THE CORPS' NINTH CHIEF

(Continued from Page 13)

placement center at Camp Sibert. In April, 1943, he was made a brigadier general.

By November, 1944, plans had been completed for a joint U.S.-British-Canadian Army, Navy and Air Force secret project to be located on San Jose Island in the Republic of Panama. General Bullene was named to command the project. He directed all phases of the construction of the project and, by introducing a number of time-saving ideas not only had the construction done in record time, but also saved the government $797,821.00 under the original engineer estimates of the cost. Under the direction of General Bullene, the tests not only resulted in disproving certain theories about gas warfare which might have proven disastrous had gas been used, but also showed the inferiority of certain munitions.

While still commanding the project, General Bullene was sent to Europe for three months to determine the cause of the excessive number of premature bursts that were occurring in the firing of 4.2-inch chemical mortar shells. He visited every mortar unit in the theater, on the front line and behind the lines, and after studying each situation was able to recommend field expedients which undoubtedly saved many lives. Once back in the States, he recommended a number of changes for inspection procedure during production of the shells which prevented faulty ammunition from getting to the troops.

For his work, his service in connection with the San Jose project, and in the European Theater, he was awarded the Legion of Merit and a Bronze Star medal.

In the summer of 1945, he became chemical officer of the U.S. Army Forces in the Western Pacific. And, immediately after VJ Day, he served as a member of the military commission which tried and convicted General Yamashita of the Japanese Army for his part in the atrocities committed against American prisoners of war and non-combatant civilians in the Philippines.

In March, 1946, General Bullene returned to the United States to become commanding general of the Army Chemical Center (formerly Edgewood Arsenal). He held this command until February of this year when he became Deputy Chief of the Chemical Corps, replacing Brigadier General Edward C. Wallington who was retiring after more than 35 years service.

As commanding general of a post where every phase of the Chemical Corps program—troops, research and development, manufacturing, proof testing, supply, and schooling—are carried on, General Bullene won more honors as an effective and efficient leader. The work load increased considerably when the Chemical Corps, in 1946, was also charged with the responsibility for defense against radiological attack, and the Chemical Center was made the focal point for this program.

Despite his arduous duties, General Bullene found time to provide athletic recreation for the youth of the Edgewood area. In the summer of 1949 he organized the Edgewood Little League. This was a full-scale baseball program for boys between the ages of 9 and 13. It was open to all youths of the Chemical Center-Edgewood area whether their parents had any connection with the post or not. The program was so well received (Edgewood's All-Star team won the Maryland pennant and entered the regional finals for the national Little League title at the close of the first summer of operation) that the youth program was carried on into the football, basketball and track seasons. This summer there are Little Leagues in operation in three other Harford County (the location of the Chemical Center) communities as a result of General Bullene's work.

The general is an ardent fisherman and duck hunter, and shows a more-than-ordinary interest in baseball. Few people can best him in conversation, for General Bullene is extremely well versed, and has a vast store of information, on a very wide range of subjects, both military and non-military.

He does not believe that there is a set, or "school," solution to any problem. He weighs every situation on its own merits and makes his decisions accordingly. To illustrate this point, the general likes to tell of a World War I occurrence. It seems that he was assigned to a field artillery battery that had been in a fixed position, opposite a German artillery battery, for some time. Both units had several definite targets on which they placed intermittent fire. As the then Lt. Bullene reported in to the battery command post he saw what he thought was a crap game. However, he soon found out that an ingenious young officer had evolved the scheme of using a set of dice to decide which target was to be fired upon and how many rounds it should be hit with. —The Germans followed a schedule of so many rounds, at a certain time, on a certain target and methodically used the same firing pattern.

A few days later a German artillery officer was captured and he immediately asked to see "the crazy American artilleryman." His nerves were badly shattered because the "unethical Americans (didn't) follow an orthodox method of firing."

"We could tell the time of day by the Germans' firing," the general comments, "and knew just when to move out of each area. They were just wasting ammunition."

It now appears that General Bullene certainly wasn't "wasting ammunition" when he asked for a detail in an organization which 26 years later he was to command.

The Armed Forces Chemical Association, on behalf of all its members, is happy to use this space to congratulate General Bullene on his new assignment, and offer its wholehearted cooperation to aid the general in fulfilling the obligations of his office.

Books Received For Review

"Optical Crystallography." Ernest E. Wahlstrom. 2nd ed. 247 pp. John Wiley & Sons, Inc., New York, N.Y. $4.50.

"The Fischer-Tropsch and Related Syntheses." Henry H. Storch, Norma Golumbic, and Robert B. Anderson. 610 pp. John Wiley & Sons, Inc., New York, N.Y. $9.00.

"Organic Reactions." Vol. 6. Roger Adam. 517 pp. John Wiley & Sons, Inc., New York, N.Y. $8.00.

"Radiation Monotoring in Atomic Defense." Dwight E. Gray and John H. Martens. 122 pp. D. Van Nostrand & Company, Inc., New York, N.Y. $2.00.

"Thermodynamics." 2nd ed. 563 pp. John Wiley & Sons, Inc., New York, N.Y. $6.50.

"The Chemistry of Hydrazine." L. F. Audrieth and Betty Ackerson Ogg. 244 pp. John Wiley & Sons, Inc., New York, N.Y. $5.00.

"Statistical Engineering in the Chemical Process Industries." Series One. James R. Thomen. 48 pp. Chemonomics, Inc. (R. S. Aries & Associates), New York, N.Y. $2.00.

"Organic Chemistry." Frank C. Whitmore. 2nd ed. 1005 pp. D. Van Nostrand & Company, Inc., New York, N.Y. $12.00

"An Introduction to Organic Chemistry." Alexander Lowy and Benjamin Harrow (Revised by Benjamin Harrow and Percy M. Apfelbaum). 7th ed. 480 pp. John Wiley & Sons, Inc., New York, N.Y. $5.00

CHEMICAL MOBILIZATION

(Continued from Page 8)

recognition by the Government of the country's dependence on industry's managers, scientists, technicians, and skilled workers; and they in turn recognize the call of duty.

For both sides, of course, the relationship often tends to be confusing and at times irritating. Our great problem—and our great opportunity—today is to find our way through the difficulties and to conquer the annoyances, or at least to keep them to a bearable minimum.

On the plus side, in the present time of crisis, one can be encouraged by the spectacle of Government bodies working more and more in close and constant cooperation with industrial groups. In March "M-45," the basic general chemical allocation order, was given *unanimous* approval by the Chemical Industry Advisory Committee before being put into effect by the National Production Authority. We also read that the industry involved was to be consulted before any chemical would be placed under allocation.

I wish I could speak in the same terms of the Price Stabilization measure. While the field is still dominated by political considerations, it is perhaps too much to hope for planning efficiency—let alone clear economic thinking.

We can all hope for good to come from the survey of the nation's chemical industry which has been started by N.P.A. to determine our potential for meeting defense and civilian requirements. We can also hope (and pray) that the survey will be completed speedily and that its results may be applied to help straighten out pressing difficulties.

And that brings me to some aspects of the situation which I feel can be improved.

First of all, our chief need is for a definition from the military of some kind of goal: how much they need and when they need it. The gentlemen of the Armed Services told us they were getting together information of this sort, but that was some time ago. Here is the bottleneck—we don't know what's wanted, or when, and we can't plan or produce properly until we know.

Speed in getting this information is important for us just as speed is important to a general when he is trying to get to a military objective ahead of the enemy. That is exactly what we in industry are trying to do—get to our production objectives before an enemy does. (Beyond the Iron Curtain, I don't think they are taking their time!)

The problem of getting needed raw materials is another of our biggest headaches. Sulphur is a key example. It is in short supply and it is short chiefly because of the general upsurge in requirements. Last year U.S. producers shipped their customers about 5,400,000 tons of sulphur, compared with 2,233,000 tons in 1939. Sulphur is a perfect example of the competing needs of the military and civilian parts of our community.

To take another example, chlorine is in tremendous demand for many military uses, while the civilian needs have mounted greatly. These needs have been recognized by the Government to the extent that it has issued certificates of necessity to chlorine producers for 35 new plants and expansion projects. But at the same time these certificates limited the amortization allotments for such expansion projects in most cases to 50 per cent over five years.

One basic trouble with this rate of amortization is that it is a much poorer arrangement than was accorded to certain other industries, although for war purposes there is no difference essentially between the various industries in question. A more enlightened amortization policy will do much to encourage the private investment equally essential to any rapid and considerable expansion. The chemical industry has to have the complete confidence of the investing public and cannot keep going without that public interest to provide capital.

Perhaps the most urgent problem confronting our industry is manpower. Let's take up the reservists first. Nearly 22 per cent of the scientists and engineers in the chemical companies are in the reserves. The military is dipping into this supply of men, most of whom, we sincerely believe, are much more needed in industry than in the Armed Forces. We would never question taking an expert chemist from an industry laboratory and putting him into a military job where his specific chemical talent is vitally important. We do question taking such a chemist away from a project involving, say, defense against bacteriological warfare, because he acquired some skill during our last war in building bridges.

It would aid industry if some definite policy could be set up governing the recall of reservists, which would permit industry to plan its manpower needs more definitely. Where a man occupies a key position in an industrial organization and has special skill, we can now sometimes get him a second or third delay after his first stay of six months. But we are never sure we can, and we cannot base plans on it. The manning tables at the end of World War II promised the relief industry had been crying for as the draft calls mounted. We hear talk of them—but there is little that seems to be very definite.

As for students subject to the draft, the Thomas Report to the National Security Resources Board, issued in January, contains a suggested program which is satisfactory to the chemical industry. Without going into details, the plan would help to maintain a continuous flow of students trained in critical scientific fields essential both to military and supporting civilian activities. It would tend to relieve our present rather desperate staff shortages, which involve an estimated need by July of this year of over 15 per cent more scientists and engineers than were on the employment rolls of the industry in January.

I hold that it is arbitrary and wasteful to draft a boy without regard to his scientific training or special talents.

I would like to think that it is not too much to hope that young men drafted into the services, if they have outstanding talents, will have those talents recognized, and be sent back to college for specialized training, just as we do in industry.

We are in complete accord with the request in the Thomas Report for the immediate creation of a National Scientific Personnel Board, functioning on the highest level, to bring to bear on scientific and technical manpower problems a technically competent and broad national point of view.

Business and industry of course have their own responsibility to help clarify and improve their relations with Government. Along this line, a recent speaker before the Commercial Chemical Development Association made a constructive suggestion. He called upon industry to take the initiative in helping Government establish practical regulations to cover controls and allocations. He called upon individual concerns to appoint key executives to the task of understanding and handling Government relations; to go to Government with information and help in making up or revising regulations; and to consider each Government-business relationship from a national as well as from a company point of view. His suggestions are detailed in the April 30 issue of *Chemical and Engineering News*. I commend the article for your reading!

Our best way to avoid a total war is to be so strong that no nation or group of nations would be so foolish as to bring one on. Or if they are so insane as to start such a war, we must be prepared to win from the start. (Mr. Vishinsky did me the honor of listing me as a war-monger. If this be war-mongering, let them make the most of it.)

America could not win unless its chemical industry is in top condition. This industry, essential in itself, is also vital to all other important industries. It includes medical supplies and the defenses against biological warfare. It is necessary for the health and energy of the folks on the home front as well as in military service.

The chemical industry is expanding more rapidly than any other phase of manufacturing. To continue this and bring the industry to the peak of usefulness the following three steps should be taken:

1. The Government should clarify to our industry just what is needed and when.
2. Fair and equitable amortization rates and certain price ceilings are urgently needed in order to build up the flow of such supplies. Bottlenecks must of course be broken on supplies of raw material.
3. We must know what to count on in the way of scientific and other skilled workers. We already are short of what we need and our needs are mounting rapidly. We need clearcut policies on calling out scientists and engineers who are reservists; and on draft policies regarding employees who are doing essential war work, and young men who will soon be ready to fill vital jobs in our field.

We have come a long way since the N.R.A. and the first days of Government regulation of business and industry. We still have a distance to go before Government and business will be working as partners with full efficiency. But we cannot wait for the future to solve our problems for us. We must do what we can, now, to work together, to solve our problems quickly and efficiently, to make our nation ready and strong—or there may be no future, either for the nation or for ourselves.

RECENT LITERATURE of National Defense Interest

Abstracted in *National Defense Review* (1951), published by the Army Library, Washington 25, D.C.

CIVIL DEFENSE, by James E. Fitzmorris, Jr., in Nat Def Trans J, v. 6 no. 6 (Nov-Dec 50) 54-56.

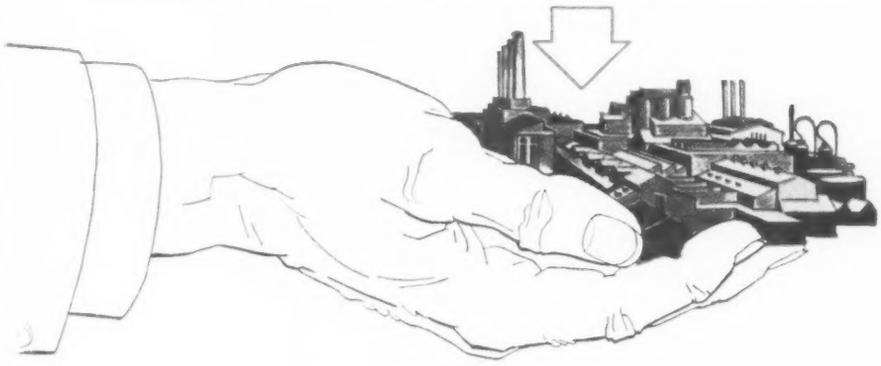
In the event of war, we must be prepared for sudden and perhaps extensive enemy action against us. Although certain areas are more likely to be attacked than others, the responsibility of the communities less likely to be attacked is not reduced as far as civil defense is concerned. The present need is for intelligent basic planning upon which operating civil defense programs at federal, state, and local levels can be built. The soundest approach is believed to be the stimulation of state and community planning in such problems as evacuation, and in devising methods whereby one community can call on another for aid. Studies should be made so that the needs for fire-fighting equipment, hospitals, and reserve supplies of water can be determined. When disaster strikes, immediate action may prevent complete calamity.

UNITED STATES CIVIL DEFENSE. HEALTH SERVICES AND SPECIAL WEAPONS DEFENSE. Washington, 50. 260 pp. (U.S. Executive Office of the President, Federal Civil Defense Administration Pub. AG-11-1.)

Functional responsibilities for civil-defense health services and special weapons defense, and a program for the development of State and local civil-defense health services. The material is organized under the following chapters: special weapons defense problems; leadership of health services in civil defense; training; first aid and ambulance service; civil defense hospital services; health supplies for civil defense; water; sanitation, special health, nutrition, laboratory, industrial health, veterinary, mortuary, and vital records and reports for civil defense health services; radiological, biological and chemical warfare defense against special weapons; and a summary for local civil defense authorities.

This small investment . . .

can save you thousands of dollars worth of hard-to-replace equipment and property



TODAY, with replacement costs rising and vital materials in limited supply, you'll want to make your present equipment last as long as possible—produce as much as possible. *Pitt Chem* Protective Coatings guard your equipment with a tough, surface-protecting film . . . an impervious sheath against strong chemicals, high temperatures, atmospheric exposure and other destructive elements of industrial corrosion and contamination.

Pitt Chem Protective Coatings are completely uniform and dependable because they are laboratory-controlled from raw materials to finished product. You'll find that the cost of safeguarding your equipment with *Pitt Chem* is surprisingly low.

• For more information, write today for new booklet, "Control Corrosion Through Pitt Chem Protective Coatings."

W&D 3726C

★ Hot Applied Tar Base Coatings
★ Cold Applied Tar Base Coatings
★ Alkyd Base Coatings
★ Chlorinated Rubber Base Coatings
★ Vinyl Base Coatings
★ Phenolic Base Coatings

OFFICES: NEW YORK • CHICAGO • ST. LOUIS
TULSA • HOUSTON • LOS ANGELES • SAN FRANCISCO

Protective Coatings Division

PITTSBURGH
COKE & CHEMICAL CO.

Grant Building • Pittsburgh 19, Pa.